भारतीय मानक
Indian Standard

IS 14106 : 2018

डायरेक्ट एक्शन हैंडपंप — विशिष्टि

(पहला पुनरीक्षण)

Direct Action Hand Pumps — Specification

(First Revision)

ICS 23.100.10

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Hand Pumps Sectional Committee MED 27

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Hand Pump Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1996 and, since then, many suggestions were received for improvement. As a result Amendments 1, 2, 3, 4, 5 and 6 were issued. This Standard is being revised to incorporate the amendments issued and the suggestions received from time to time.

Direct action hand pumps (DAHP) are installed on boreholes for water table depth up to 15m. A plunger is attached to the lower end of a pump rod, beneath the groundwater level and the user moves the pump rod in an up-and-down motion, using a T-bar handle. On the up-stroke, the plunger lifts water into the rising main, and replacement water is drawn into the cylinder through the foot valve. On the down-stroke, the foot valve closes, and water passes through a one-way valve in the plunger and is lifted on the next up-stroke. Direct action pumps operate without the help of leverage, linkages and bearings, and depend on the strength of the operator pumping to lift the column of water as such pumps can only be used to depths from which an individual can physically lift the column of water (about 12 m). However, the mechanical simplicity, low cost and lightweight construction make these pumps well equipped to meet operations and maintenance (O and M) objectives at the village level. India has the largest national rural water supply programme in the world using deepwell hand pumps and DAHP being simple in action, cheaper to buy and operate have proved to be the most dependable and cheapest mode of potable water supply to the rural masses in India.

For the purpose the deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off values should be the same as that of the specified value in this standard.

Indian Standard

DIRECT ACTION HAND PUMPS — SPECIFICATION

(First Revision)

1 SCOPE

This India Standard specifies direct action hand pumps suitable for lifting water from borewells with static water level not exceeding 15m.

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 NOMENCLATURE

3.1 Combination Spanner

This is the spanner required for the maintenance of the pump.

3.2 Cylinder Assembly

The cylinder assembly consists of cylinder pipe, piston, piston rod, and foot valve and foot valve receiver. It provides necessary pumping action and lifts water upward through rising main.

3.3 Pump Head Assembly

The above ground structure, consisting of pump body, handle and stand supports the whole system. Up and down movement of the handle operates the piston in the cylinder.

3.4 Pump Rod Assembly

The pump rod assembly provides linkage between pump handle and piston in cylinder. With its light weight and high displacement capacity, these rods are buoyant and help in reducing the effort required during upward stroke.

3.5 Retrieving Rod Assembly

The retrieving rod assembly helps in extracting foot valve assembly from cylinder for maintenance.

3.6 Rising Main

The rising main carries water from cylinder to pump head.

3.7 Tubewell Assembly

The tubewell assembly consists of:

a) Upper casing,
b) Lower casing, and
c) Well screen assembly.

NOTE — Bell length is not included in upper casing and lower casing pipe length.

4 GENERAL REQUIREMENTS

4.1 The material, dimensional details and tolerances shall be as given in Fig. 1 to 38. For all linear and angular dimensions where tolerances are not specified, the tolerances as per class C of IS 2102 (Part 1), shall be applicable. All sharp comers and edges shall be rounded off.

4.2 The dimensions for un-plasticised polyvinyl chloride (uPVC) pipes for different components shall be as given in Table 1. The material and test requirements for uPVC pipes shall conform to IS 12818.

4.3 The number of lengths of uPVC pipe for different components for a particular installation shall depend on the tube well parameters mentioned below:

a) Lower casing : Depth of aquifer
b) Well screen : Nature of aquifer (minimum 2 m)
c) Upper casing : Static water level
d) Rising main : Seasonal fluctuations and
e) Pump rod

4.4 The bell dimensions for upper lower casing and sand trap shall be as given in Table 2.

4.5 PVC injection moulded fittings shall conform to IS 7834 (Part 1), except for hydraulic test mentioned at **6.4** of IS 7834 (Part 1).

4.6 The high-density polyethylene (HDPE) parts shall be moulded from materials conforming to IS 7328.

4.7 Polyacetal components are shown in Fig. 22A and Fig. 22B and properties of polyacetal, for guidance only, are given in Annex B.

Table 1 Dimensions for Unplasticised Polyvinyl Chloride (uPVC) Pipes for Different Components

(*Clause* 4.2)

All dimensions in millimeters.

Sl. No.	Item	Nominal Diameter	Mean Outside Diameter		Wall Thickness		Length
			Min	*Max*	*Min*	*Max*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Upper casing	80	88.0	88.3	4.0	4.6	3000^{+1} 0°
ii)	Rising main	50	60.0	60.2	2.5	3.0	3000^{+1} 0°
iii)	Lower casing	40	48.0	48.2	3.5	4.0	3000^{+1} 0°
iv)	Top pump rod	32	42.0	42.2	2.2	2.7	1000^{+1} 0°
v)	Pump rod	32	42.0	42.2	2.2	2.7	3000^{+1} 0°
vi)	Sand trap	40	48.0	48.2	3.5	4.0	1000^{+1} 0°
vii)	Piston rod	32	42.0	42.2	2.2	2.7	1000^{+1} 0°
viii)	Cylinder pipe	50	60.0	60.2	2.5	3.0	3000^{+1} 0°

Table 2 Bell Dimensions for Upper and Lower Casing Pipes and Sand Trap

(All dimensions in millimetre)

Sl. No.	Pipe References	Nominal Diameter	Socket Depth	Mean Socket at Mouth		Internal Diameter at Root	
			Min	*Min*	*Max*	*Min*	*Max*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Upper casing	80	60	88.3	88.5	87.8	88.0
ii)	Lower casing	40	40	48.2	48.4	47.8	48.0
iii)	Sand trap	40	40	48.2	48.4	47.8	48.0

4.8 The solvent cement used shall conform to IS 14182. The cement solution shall not contain any material which imparts taste or colour to water or has any toxic effect or faster bacterial growth. Before cementing the joint, the mating surfaces shall be made rough by rubbing with emery paper and cleaned with suitable cleaning fluid.

4.9 The nitrile rubber components shall conform to specifications given in Annex C.

4.10 The steel plate/sheets and round bar shall conform to Grade A of IS 2062.

4.11 The spring steel wire shall conform to IS 4454 (Part 1).

4.12 The stainless steel components shall conform to grade “X04 Cr 19 Ni 9” of IS 6603 with following mechanical properties:

a) Tensile strength: 800MPa, Min; and

b) Elongation: 15 percent, Min.

4.13 The welding of the mild steel components shall be done in accordance with IS 9595. Welding for stainless steel components shall conform to IS 2811. Alternatively stainless steel components may be welded by manual arc welding using suitable electrodes confirming to IS 5206. Unless otherwise specified, the minimum specified thickness of the member to be welded shall be the guiding factor for deciding the weld fillet size. It shall normally be not less than the minimum specified thickness of the members to be welded.

4.14 The stainless steel bolts and nuts shall conform to IS 1367 (Part 14/Sec 1, 2 and 3) as may be applicable. The carbon steel bolts and nuts shall conform to IS 1367 (Part 2).

4.15 The washers shall conform to Type A of IS 2016.

4.16 The steel tubes shall conform to IS 1239 (Part 1).

4.17 The cast iron castings shall conform to grade FG 150 of IS 210.

4.18 Some of the dimensions of the components may undergo minor changes after welding. In such cases the dimensions shall be checked before welding.

4.19 Till such time adequate gauging practices are available for knuckle threads, interchangeability between mating components shall be ensured.

5 ANTICORROSIVE TREATMENT

The hand pumps shall be given following anticorrosive treatment.

5.1 Electro Galvanizing

All carbon steel bolts and nuts shall be electro galvanised and zinc passivated conforming to service Grade No.2 of IS 1573. The handle retainer and retrieving rod and combination spanner shall be electro galvanized and zinc passivated conforming to service Grade No.4 of IS 1573.

5.2 Galvanizing

The following carbon steel assemblies shall be hot dip galvanized according to IS 4759, and given chromate conversion coating according to **5.9** of IS 2629.

a) Head,
b) Handle,
c) Stand, and
d) Intermediate flange.

6 TESTING

6.1 Visual Tests

All the pumps in the lot shall be examined for workmanship, finish and visual defects.

6.2 Dimensional and Other Tests

6.2.1*Sampling*

Unless otherwise specified in the contract or order, the procedure given in IS 2500 (Part 1), shall be followed for sampling inspection. For the characteristics given under **6.2.2**, the single sampling plan with general inspection level I and AQL of one percent as given in Table 1 and Table2 a of IS 2500 (Part 1) shall be followed.

Sample shall be drawn from the pumps conforming to the requirements given in **6.1.**

6.2.2 All the samples selected as per **6.2.1** shall be checked for the following:

a) Alignment of groove in the top guide bush with respect to the nuts welded on pump body;
b) Alignment of handle nut with pipe for concentricity;
c) Interchangeability of the components;
d) Location of the holes in the pump head-flange with respect to the direction of the spout;
e) Reasonable flatness of the flanges to provide proper matching of the holes to ensure unrestricted insertion of the bolts.
f) Machining of faces indicated in respective figures of piston plate, follower plate and foot valve body.
g) Concentricity of the two internal diameter of the reducing socket;
h) Concentricity of the connectors and adopters in relation to the PVC pipe after solvent cementing the joint and
j) Hardness of rubber components.

6.2.3 Two complete pumps out of the pumps selected according to **6.2.1** shall be checked for the critical dimensions of its assemblies and individual components.

6.3 Routine Tests

6.3.1 Two cylinders out of the samples selected shall be fitted with foot valve assemblies, kept in vertical positions, filled with water and subjected to internal hydraulic pressure of 0.1 MPa for 30 min. No leakage shall be observed.

6.3.2 Two pumps shall be separately tested for discharge test. The test shall start only after getting continuous flow of water through the spout. The quantity of water thus collected for 30 continuous strokes of 300 mm length, completed in one minute, shall not be less than 21 l.

6.3.3 All PVC pipes in the selected samples shall be subjected to routine tests as given in IS 12818.

6.4 Test for Joints

6.4.1 One joint each made from randomly selected pump rod, riser pipe, upper casing and lower casing in the manner described below, shall withstand an internal hydraulic pressure of 0.9 MPa for 30 min without showing any sign of leakage:

a) **Pump Rod** — Two pieces, each of 250 mm length, shall be taken from both the ends of the pump rod so that one has male adapter while the other has female adapter at one end with other ends open. The test pressure shall be applied to each piece separately, from their respective open ends.
b) **Riser Pipe** — Two pieces, each of 500 mm length, shall be taken from both the ends of the riser pipe, so that one has male adapter while the other has female adapter at one end with other ends open. Both the pieces shall be screwed together, with ‘O’ ring in position to form one specimen to be subjected to hydraulic test.
c) **Upper Casing and Lower Casing** — The bell and spigot joint one each for upper and lower casing shall be solvent cemented and shall be allowed to cure for at least two hours before testing. The test pieces shall have a total length of one meter with joint at the middle.

6.4.2 *Load Test*

Two pieces of pump rod taken in the manner and of the same length as described in **6.4.1** (a) shall be screwed together. The same pieces tested for leakage of joint may be used. The specimen, when tested, shall be able to withstand minimum tensile proof load of 2.5 kN (250 kg) for 15 min without slippage or breakage of joint at the thread or cementing.

6.5 Criteria for Conformity

The lot shall be considered conforming to the requirements of specification, if the pumps selected according to **6.2.1** satisfied the following conditions:

a) The number of pumps not meeting the requirements of a characteristics inspected under **6.2.2** and critical dimensions given in **6.2.3** shall not exceed the corresponding acceptance number, and
b) All the pumps inspected according to **6.3** and **6.4** shall meet the requirements specified there in.

7 GUARANTEE

The pump and accessories shall be guaranteed against bad workmanship/ material for 12 months from the date of installation or, 18months from the date of supply whichever, is earlier.

8 MARKING

8.1 The hand pumps complying with this standard shall be durable and legibly marked in service with:

a) The pump head shall have a name plate with name of manufacturer and serial number of the pump.
b) The head flange, the intermediate flange and the stand flange shall have steel punch impression of manufacturer’s identification mark deep enough to be visible after galvanizing.
c) All uPVC pipes including cylinder pipe shall be clearly and indelibly marked (preferably screen printed) with following:
    i) Manufacturer’s identification mark,
    ii) Name of the component, and
    iii) Batch number which can be co-related with production/internal quality control records.

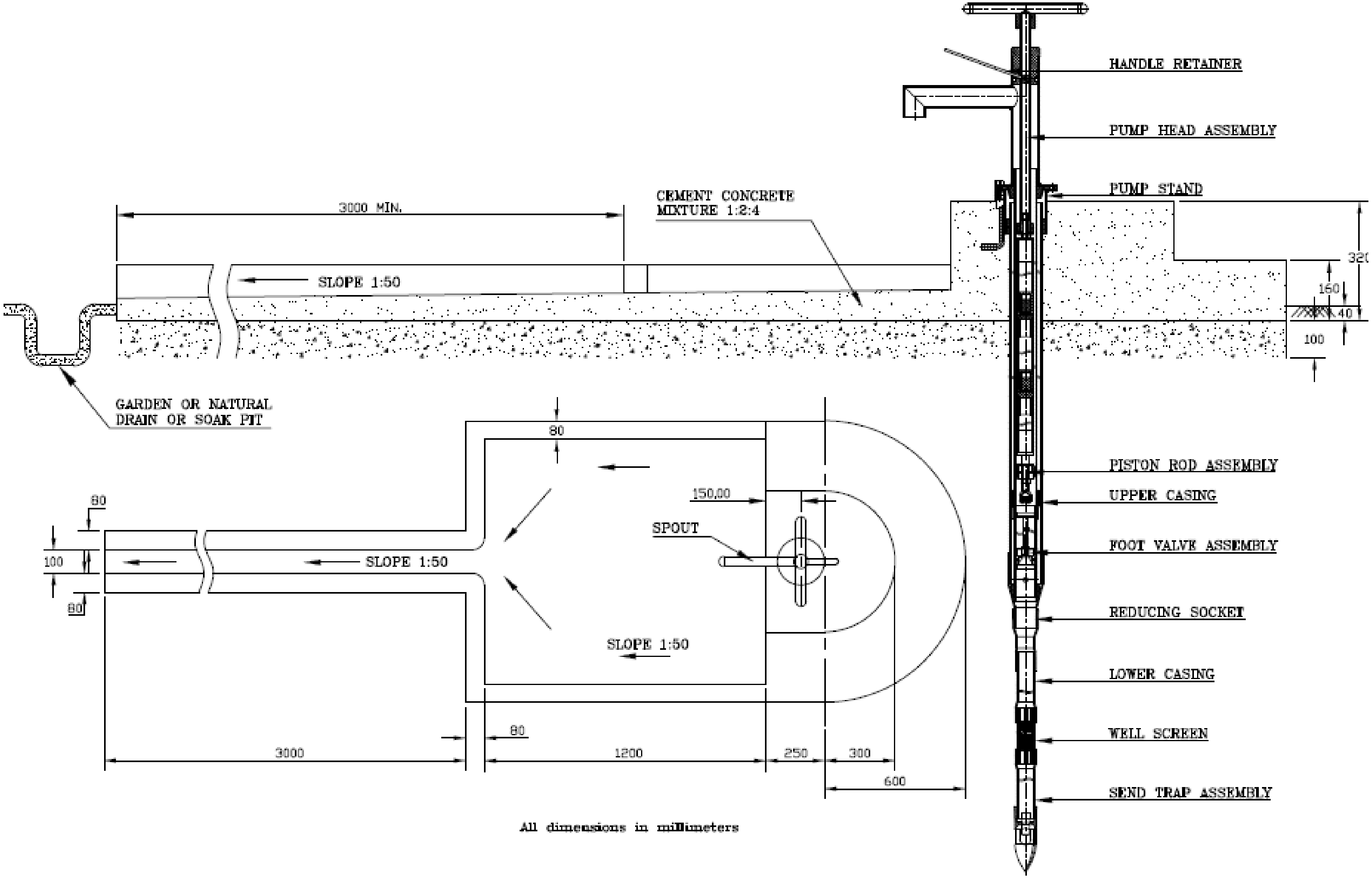
8.2 BIS Certification Marking

The pumps may also be marked with the Standard Mark.

8.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations made thereunder. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

9 PACKING

Unless otherwise specified in the contract or order, the packing shall be as per details given in Annex D.



All dimensions in millimeters

FIG. 1 TYPICAL SET UP FOR DIRECT ACTION HAND PUMP

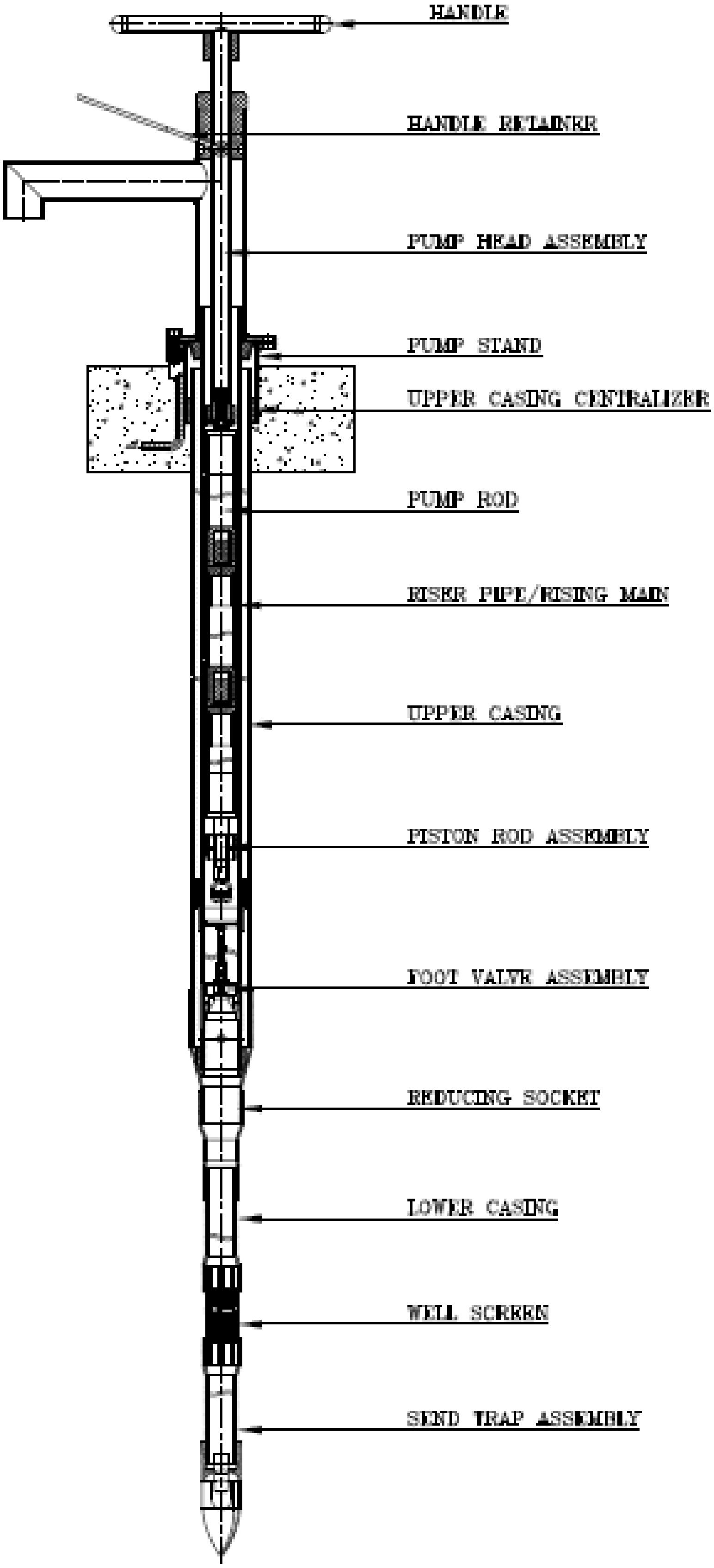
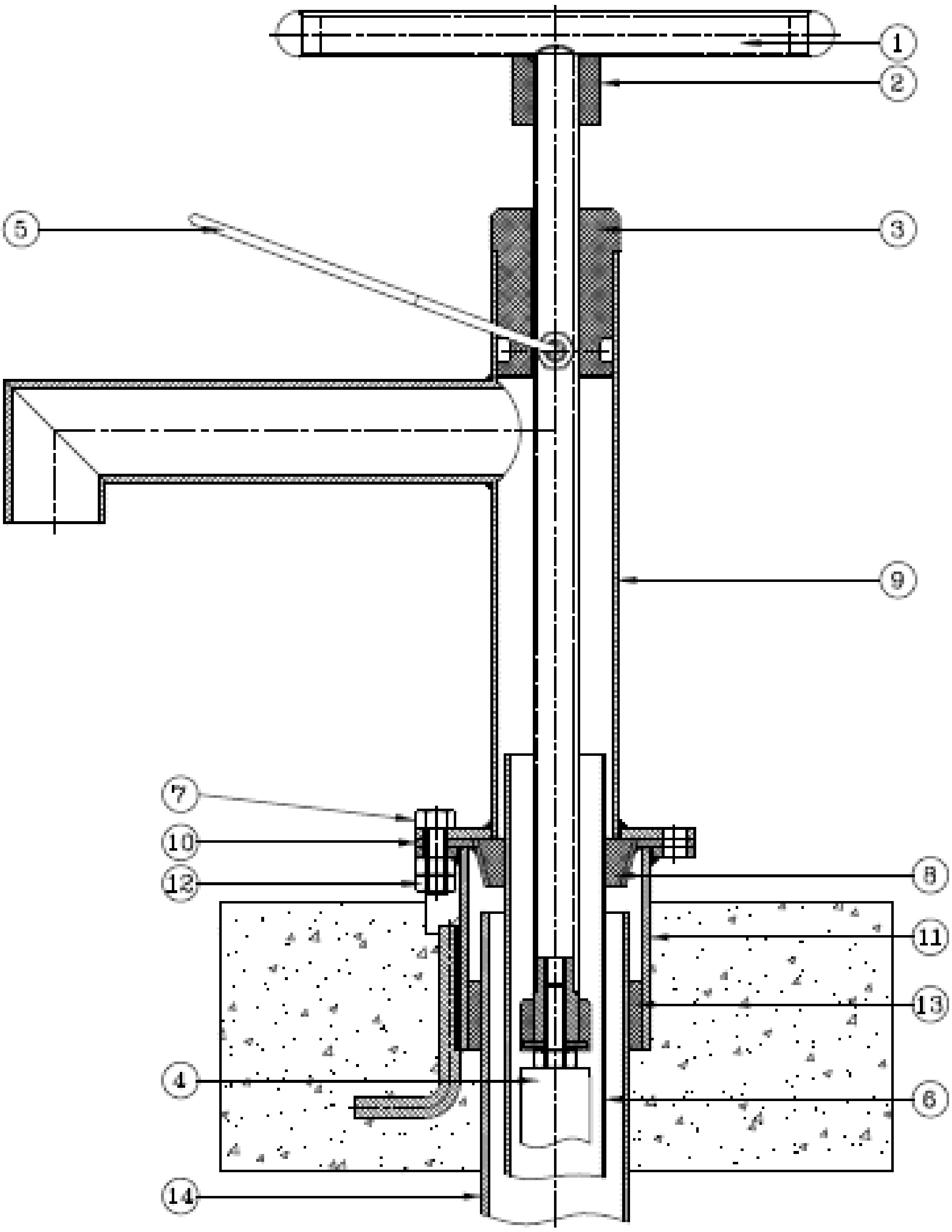
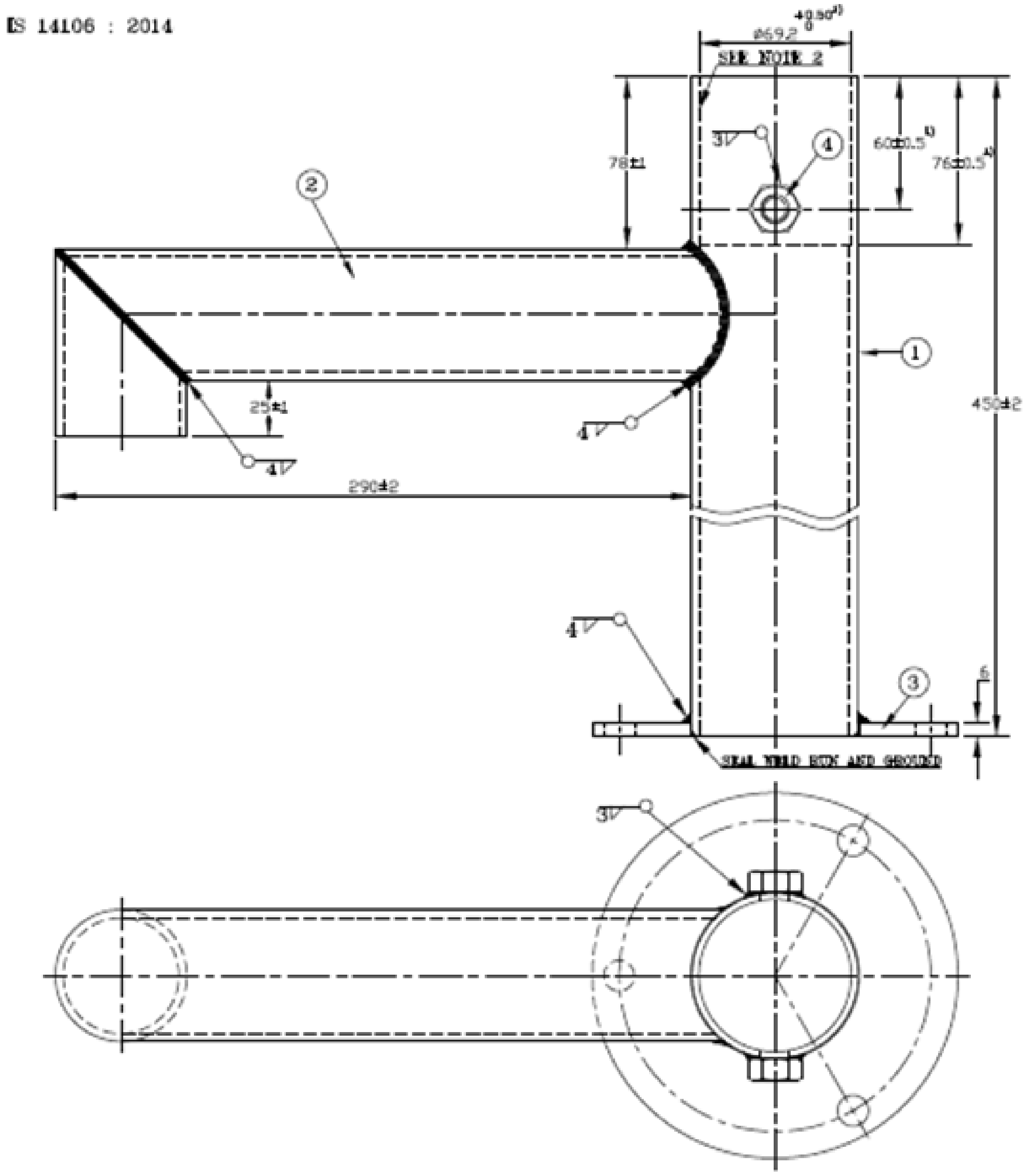


FIG. 1A HANDPUMP ASSEMBLY



14	—	Upper well casing pipe	uPVC
13	1	Upper well casing Centralizer	Nitrile rubber
12	6	Hex nut M12	IS 1363 (PART-3) : 2002
11	1	Pump stand	GRADE A OF IS 2062 : 2011
10	1	Intermediate flange	GRADE A OF IS 2062 : 2011
9	1	Pump head	GRADE A OF IS 2062 : 2011
8	1	Grommet	Nitrile rubber
7	3	Hex bolt M12x40	IS 1363 (PART-2) : 2002
6	—	Rising main	uPVC
5	1	Handle retainer	IS 4454 (PART-1) : 2001
4	1	Pump rod top	uPVC
3	1	Top guide bush	HDPE
2	1	Handle cushion top	Nitrile rubber
1	1	Handle	IS 1239 (PART-1) : 2004
Part No.	**NO. Off**	**Description**	**Material**

FIG. 2 PUMP HEAD ASSEMBLY



Part.NO	No.Off	Description	Material
4	2	Hex. nut M12	IS 1363 (Part-3) : 2002
3	1	Pump head flange	Grade A of IS 2062 : 2011
2	1	Spout	IS 1239 (Part-1) : 2004
1	1	Body	IS 1239 (Part-1) : 2004

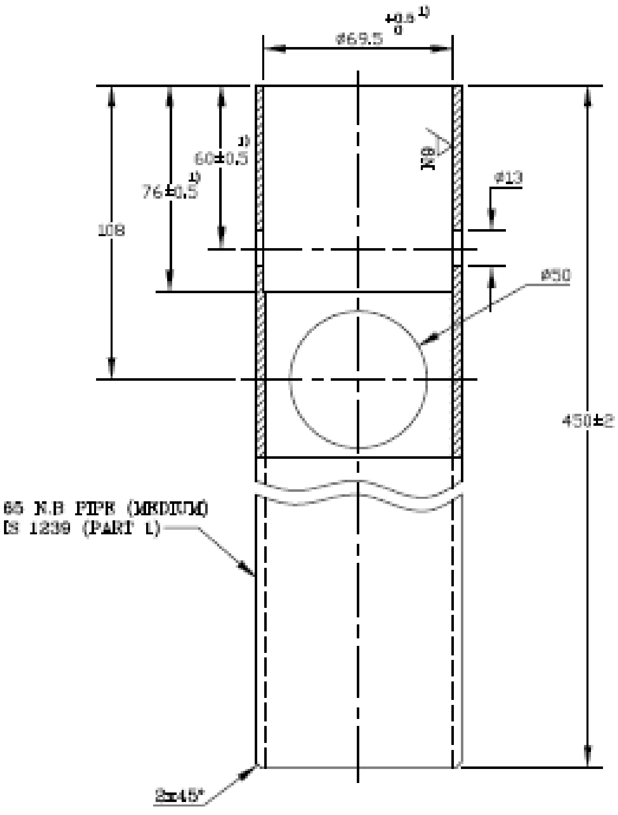
NOTES

1 Dimension indicated are galvanising

2 Ovality of machined portion to be removed after galvanising.

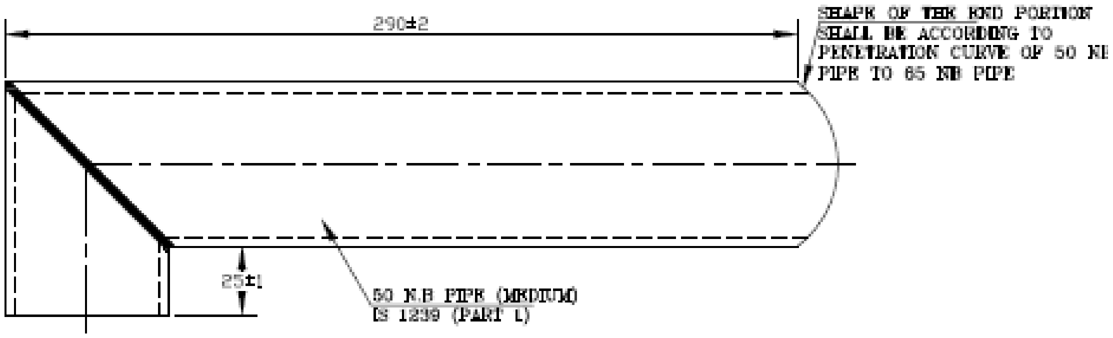
All dimensions in millimeters

FIG. 3 PUMP HEAD



1) Indicates critical dimensions.

4A Body

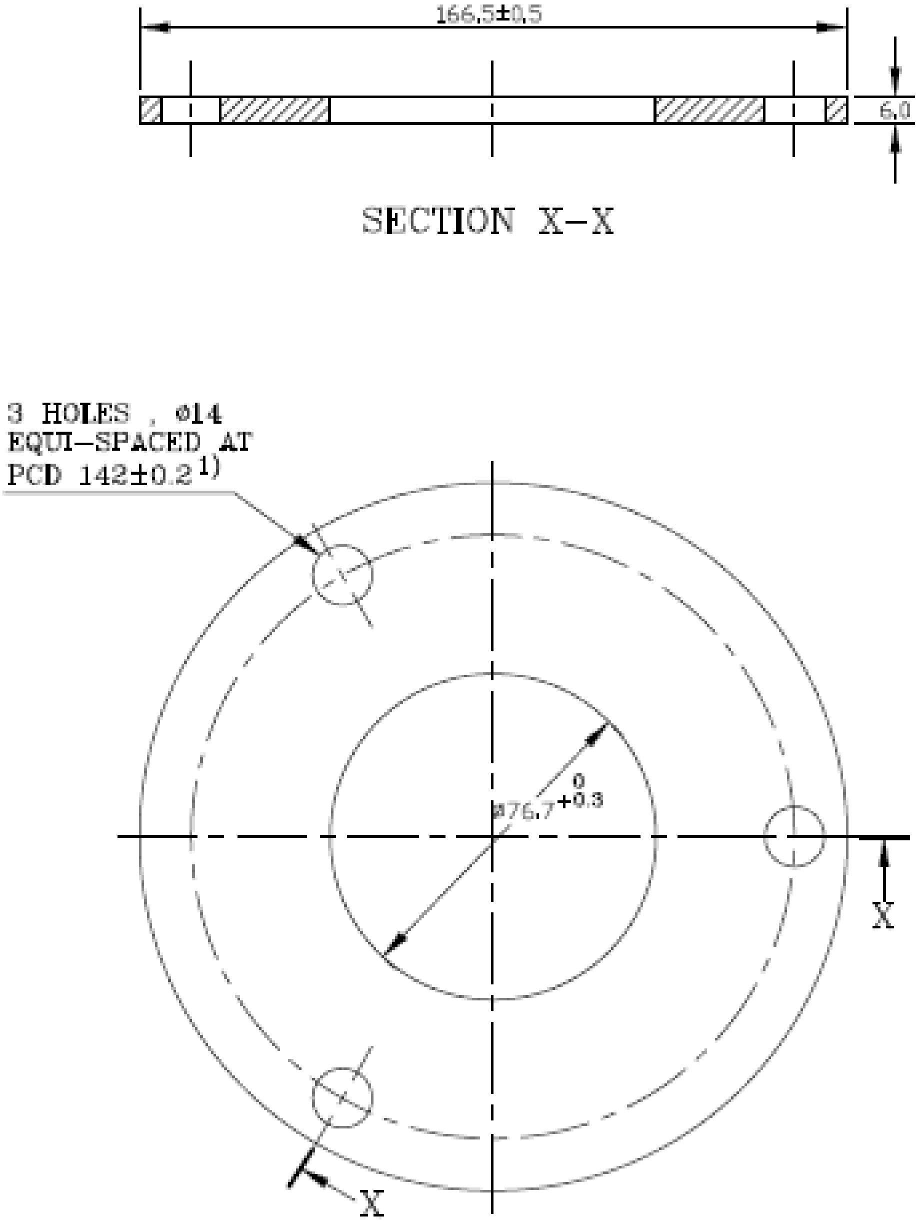


4B Spout

All dimensions in millimeters

FIG. 4 PUMP HEAD PARTS — Continued

FIG. 4 PUMP HEAD PARTS (*Continued*)

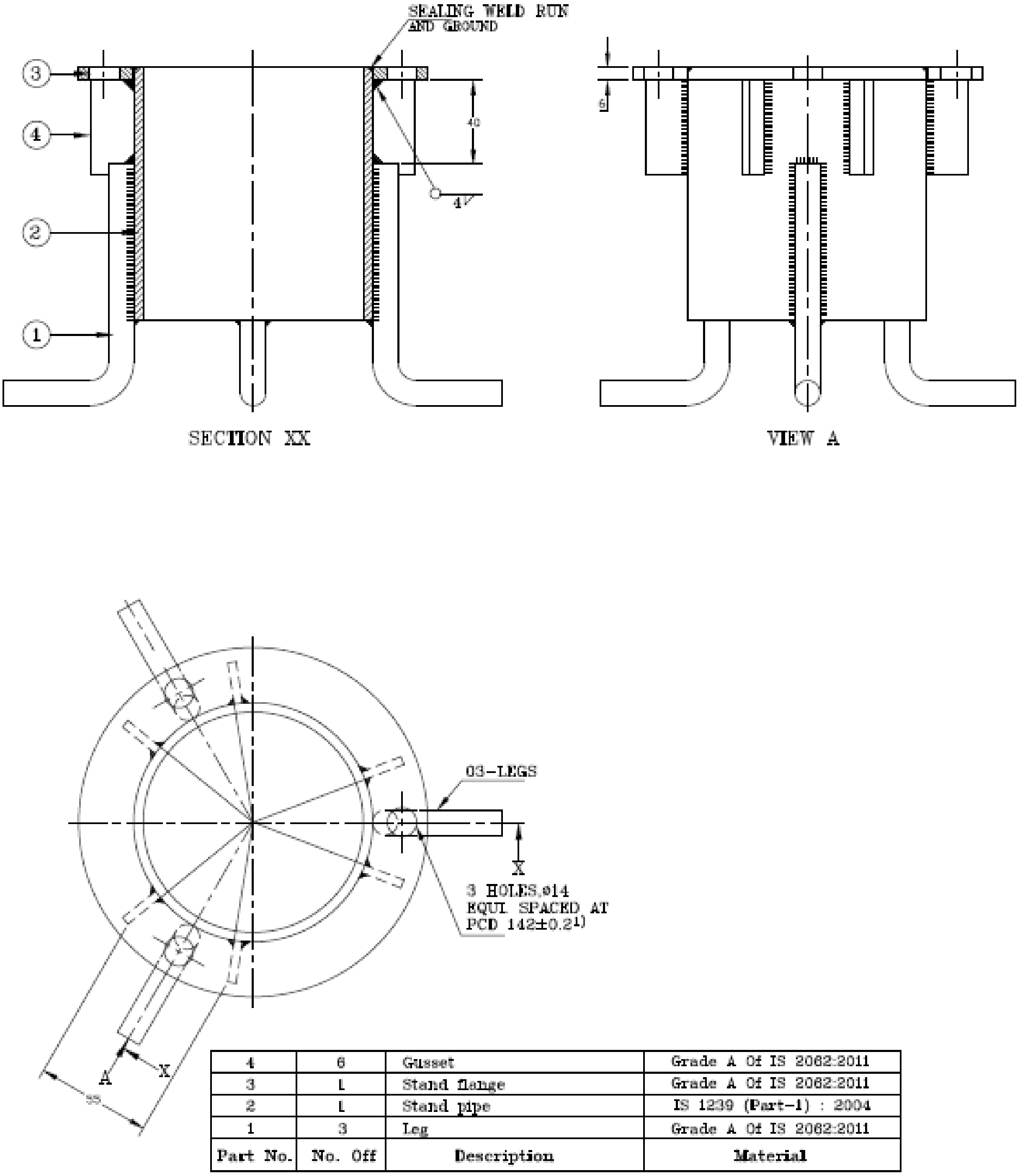


1) Indicates critical dimensions

4C PUMP HEAD FLANGE

All dimensions in millimeters

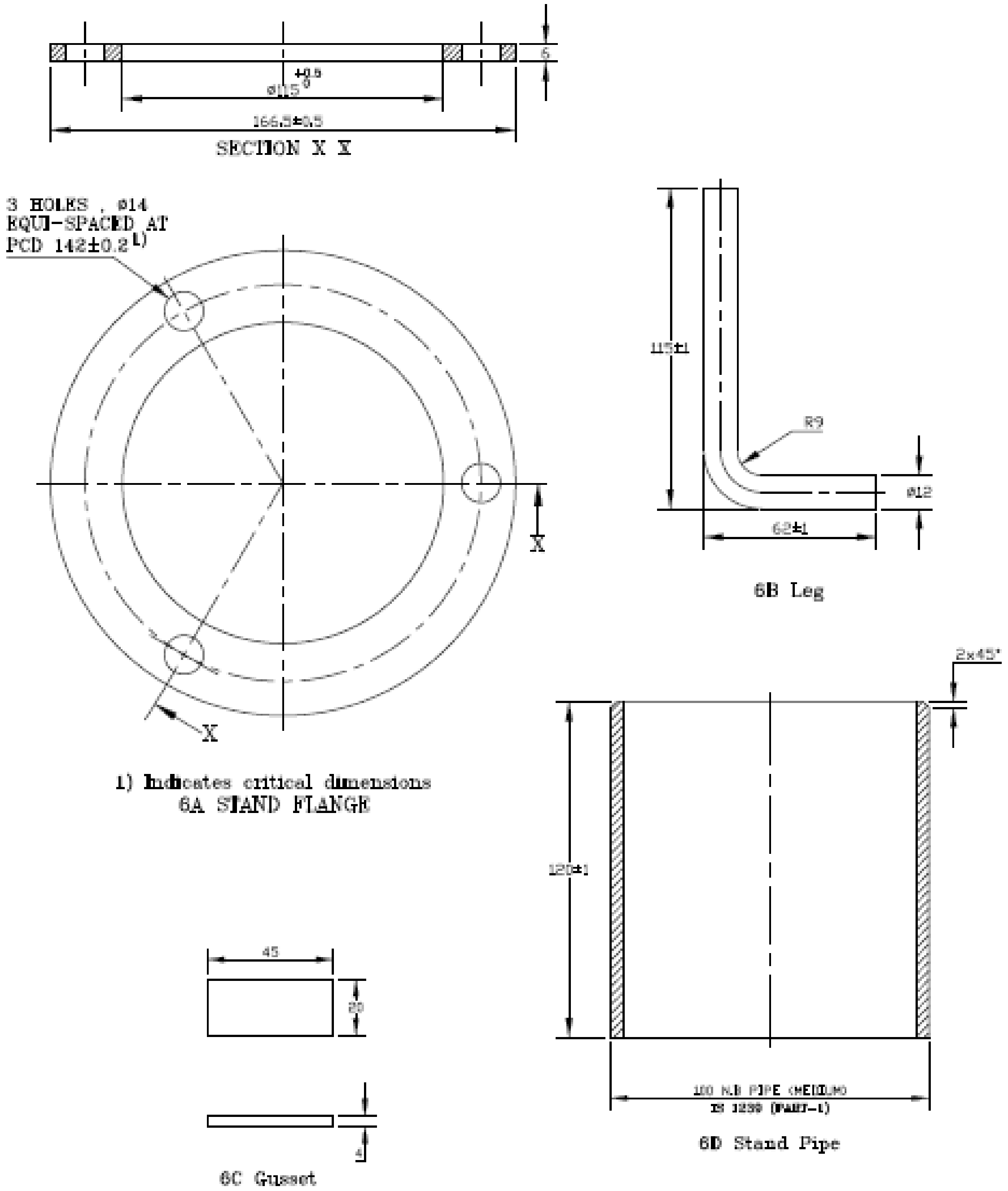
FIG. 4 PUMP HEAD PARTS


SEALING WELD RUN AND GROUND
3
4
2
1
40
4
6
SECTION XX
VIEW A
03-LEGS
X
3 HOLES,ø14 EQUI SPACED AT PCD 142±0.2 1)
A
X
55

Part No.	No. Off	Description	Material
4	6	Gusset	Grade A Of IS 2062:2011
3	1	Stand flange	Grade A Of IS 2062:2011
2	1	Stand pipe	IS 1239 (Part-1) : 2004
1	3	Leg	Grade A Of IS 2062:2011

1) Indicates critical dimensions
All dimensions in millimeters

FIG. 5 PUMP STAND



1) Indicates critical dimensions

6A STAND FLANGE

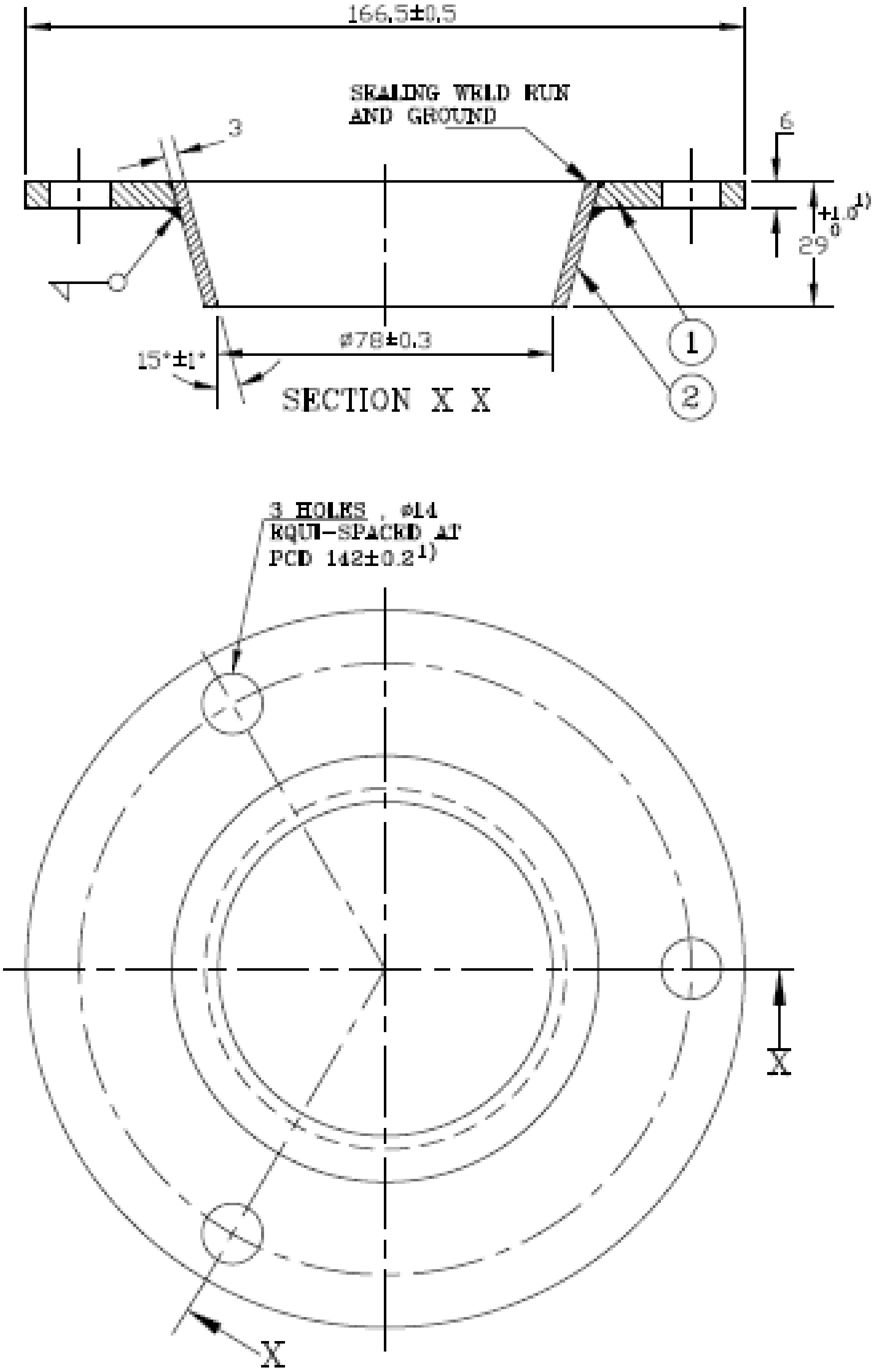
6B Leg

6C Gusset

6D Stand Pipe

All dimensions in millimetres

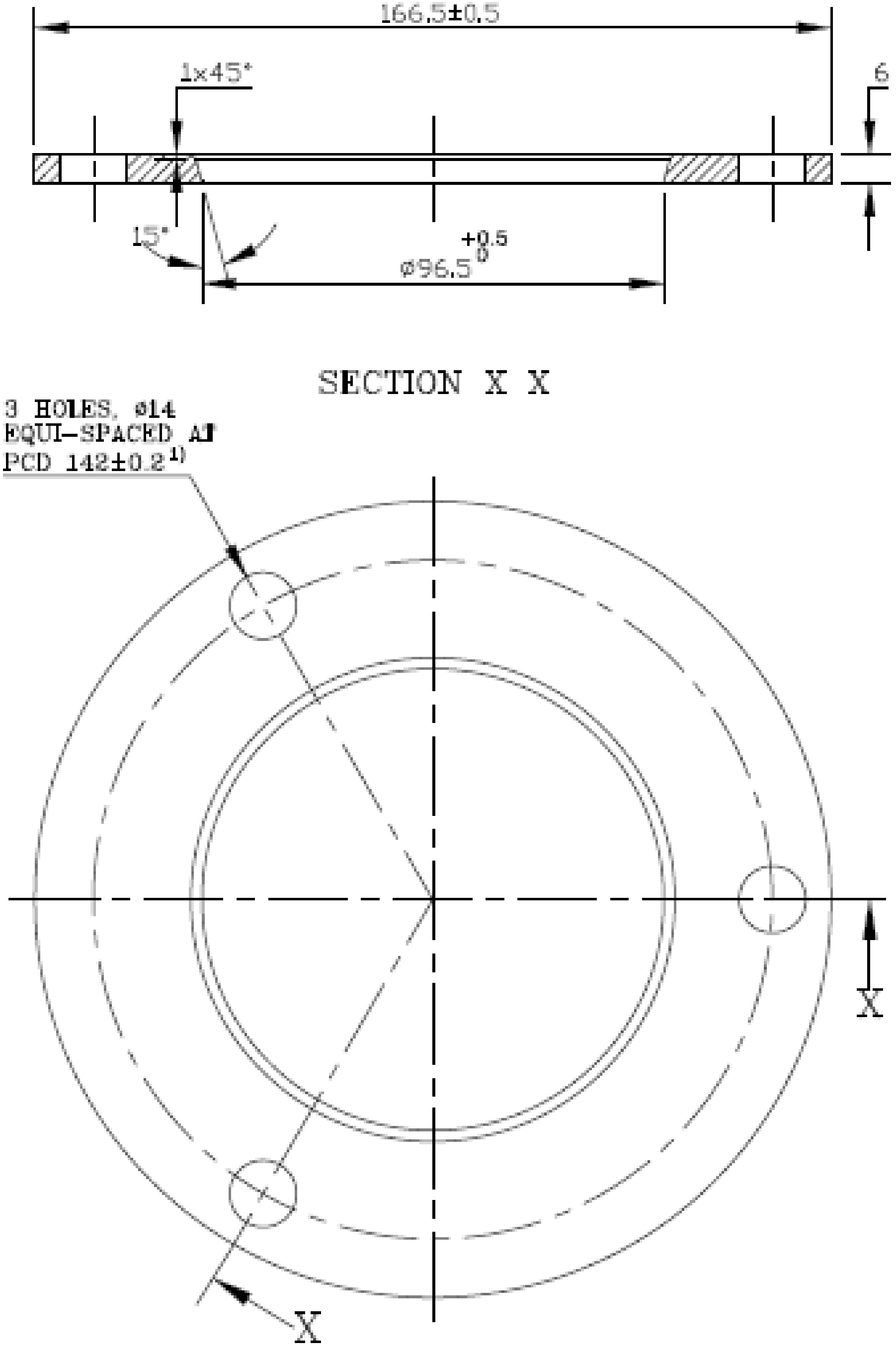
FIG. 6 PUMP STAND PARTS



2	1	Cone	Grade A Of IS 2062:2011
1	1	Flange	Grade A Of IS 2062:2011
Part No.	**No. Off**	**Description**	**Material**

1) Indicates critical dimensions
All dimensions in millimeters

FIG. 7 INTERMEDIATE FLANGE

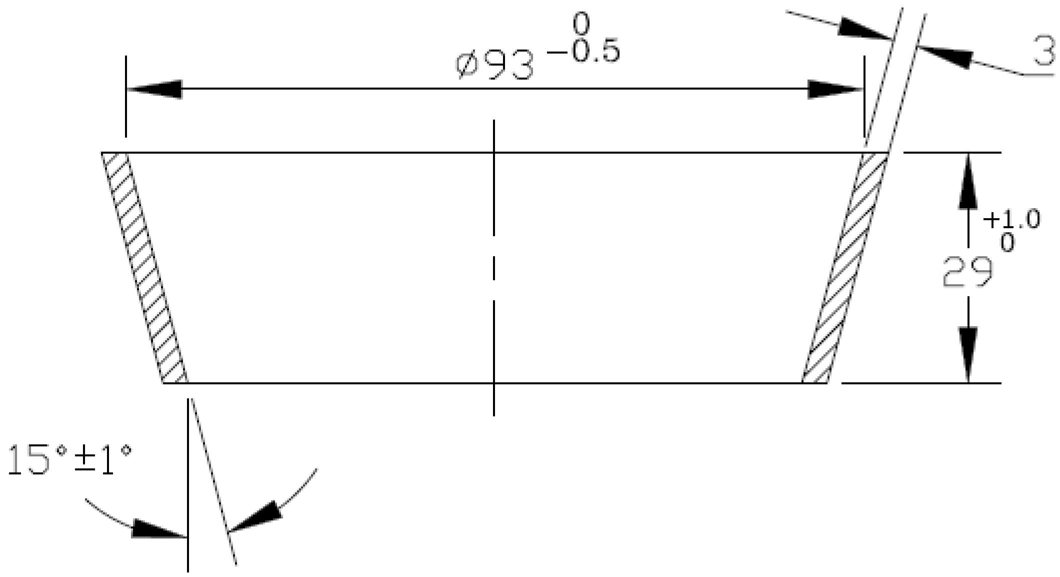


1) Indicates critical dimensions

8A FLANGE

All dimensions in millimeters

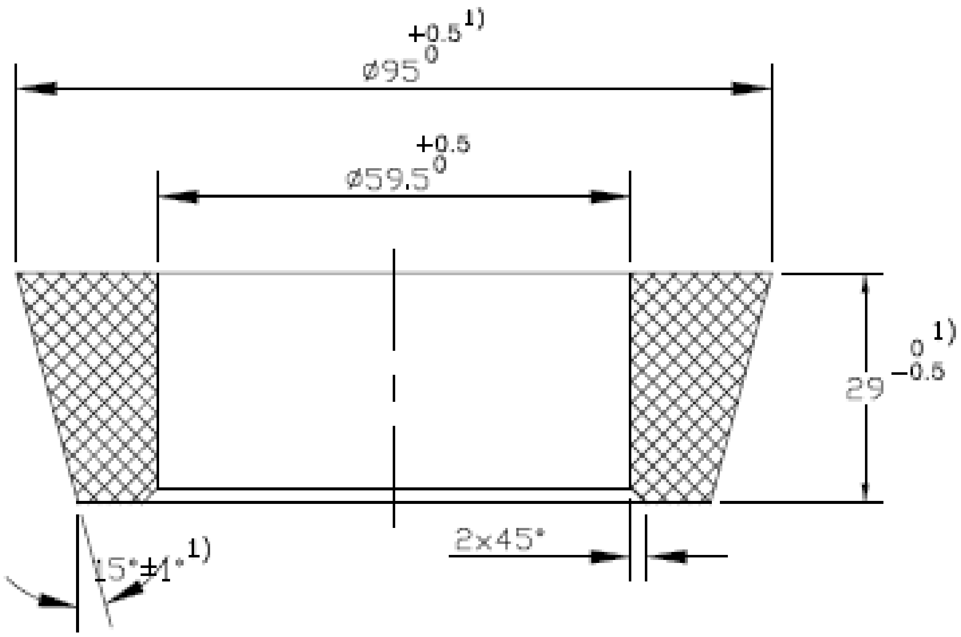
FIG. 8 INTERMEDIATE FLANCE PARTS (*Continued*)



8B CONE

All dimensions in millimeters

FIG. 8 INTERMEDIATE FLANCE PARTS

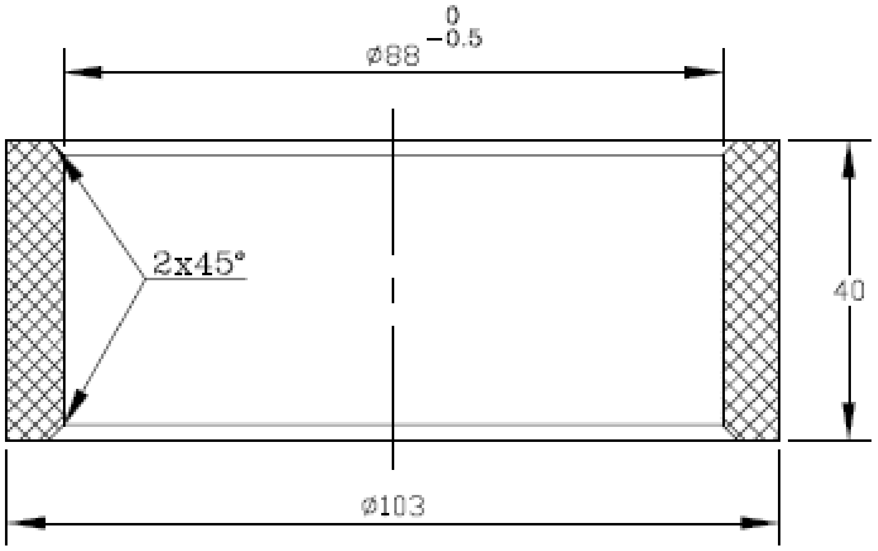


Shore hardness 65 t0 75 on scale A

1) Indicates critical dimensions

All dimensions in millimeters

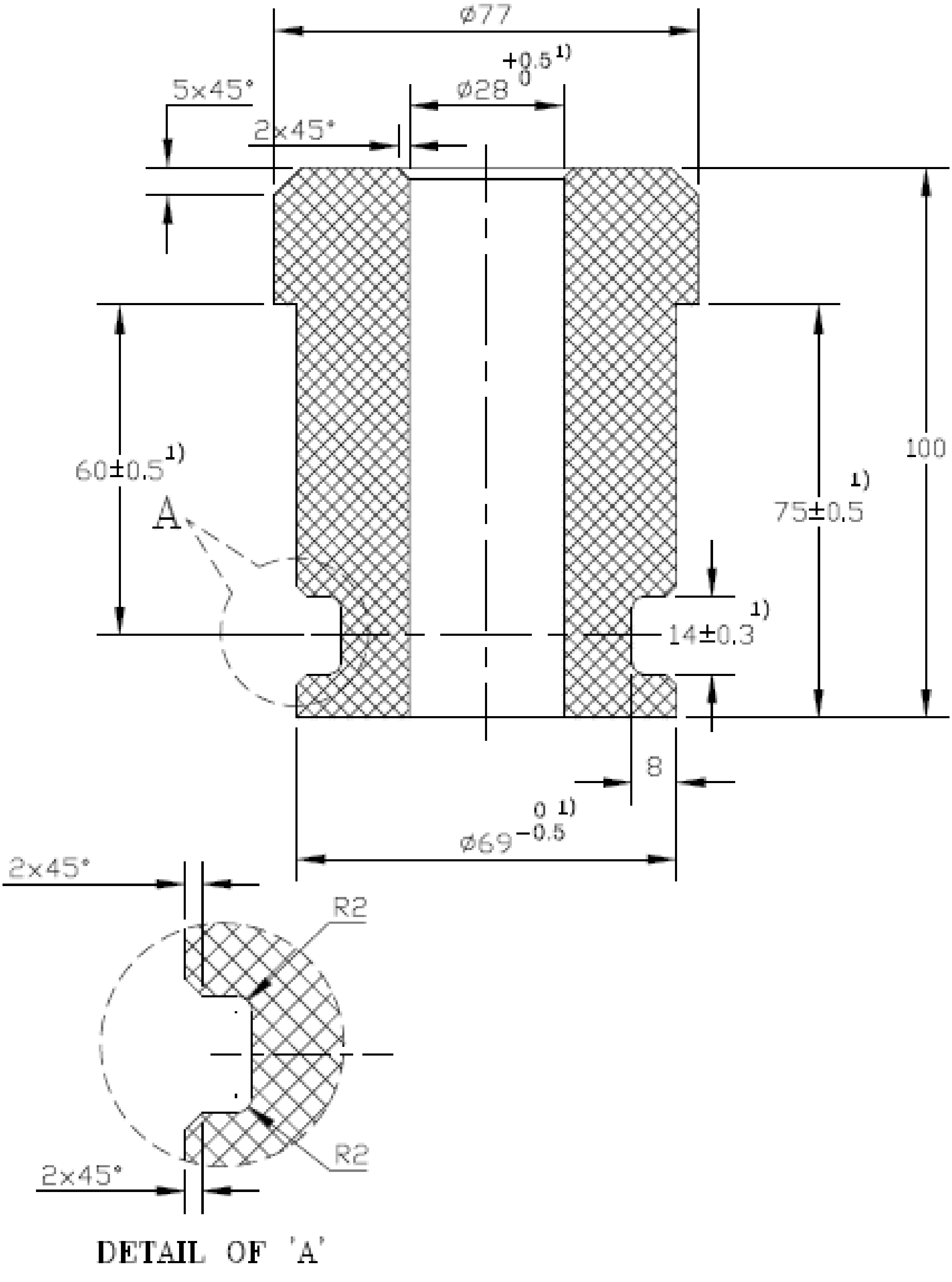
FIG. 9 GROMMET



Shore hardness 65 t0 75 on scale A

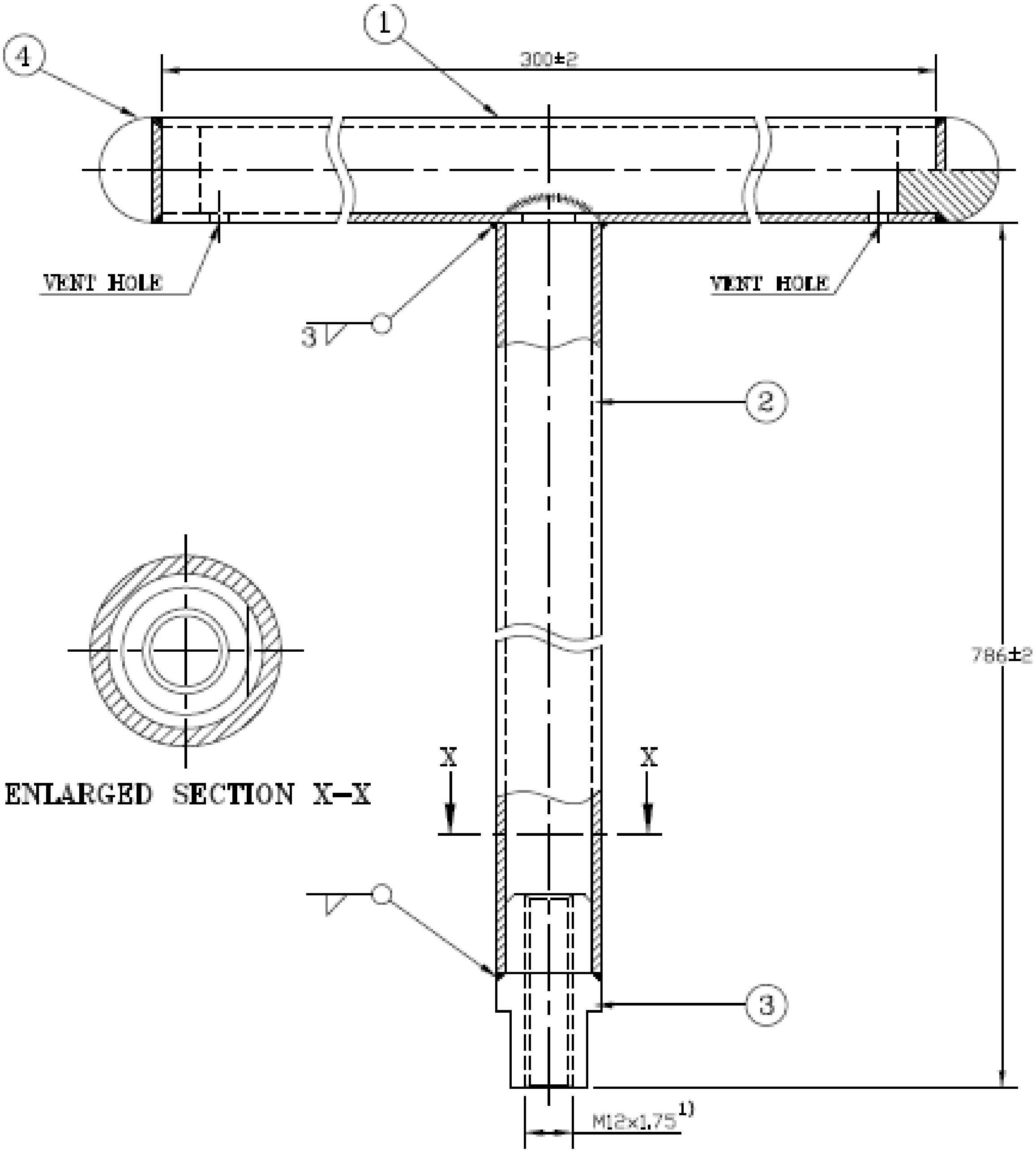
All dimensions in millimeters

FIG. 10 UPPER WELL CASING PIPE CENTRALIZER



1) Indicates critical dimensions
All dimensions in millimeters

FIG. 11 TOP GUIDE BUSH



4	2	End plug	Grade A OF IS 2062:2011
3	1	Handle nut	Grade A OF IS 2062:2011
2	1	Pipe	IS 1239 (Part-1) : 2004
1	1	Handle	IS 1239 (Part-1) : 2004
Part No.	No.Off	Description	Material

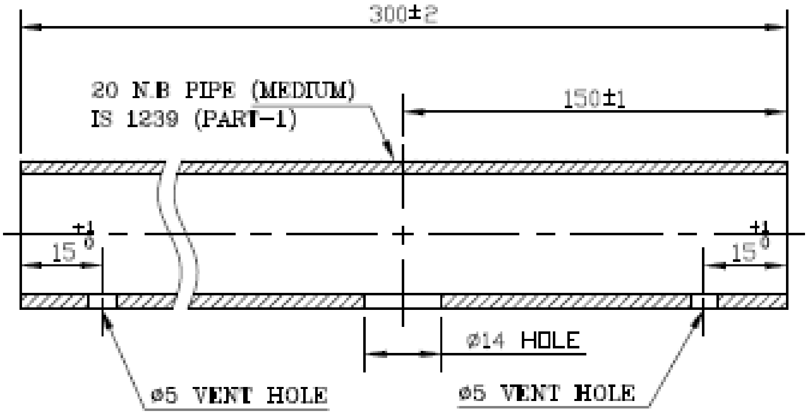
NOTES

1 Align flat on handle nut with seam in pipe before assembly

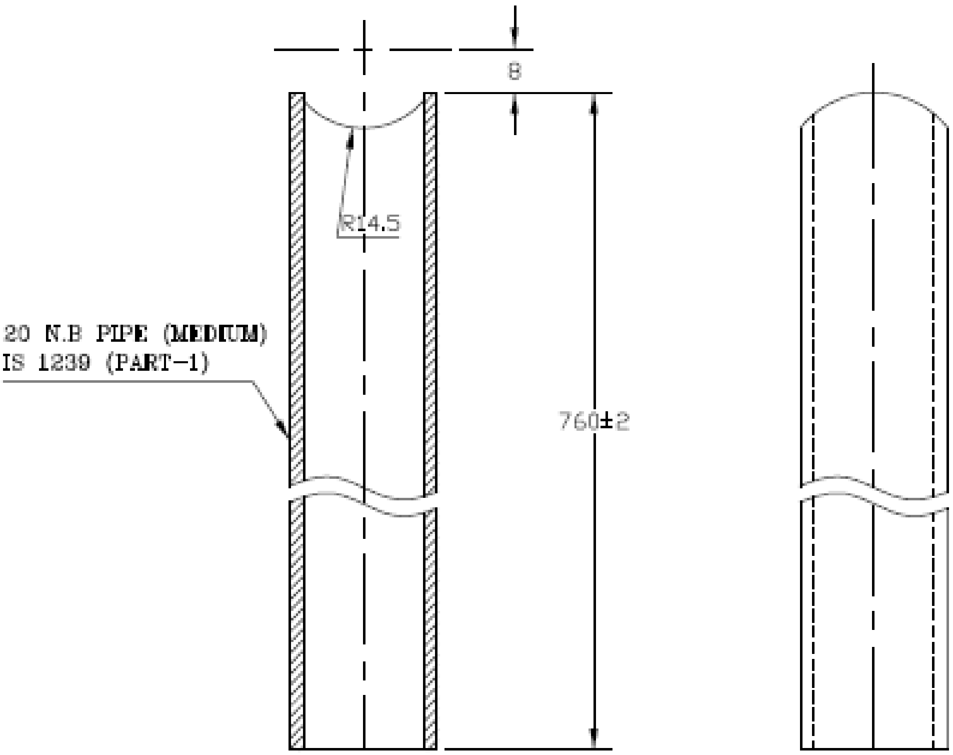
2 Welding of handle nut and end plug to pipe shall be machined to match pipe O.D

1) Indicates critical dimensions
All dimensions in millimeters

FIG. 12 HANDLE



13A Handle

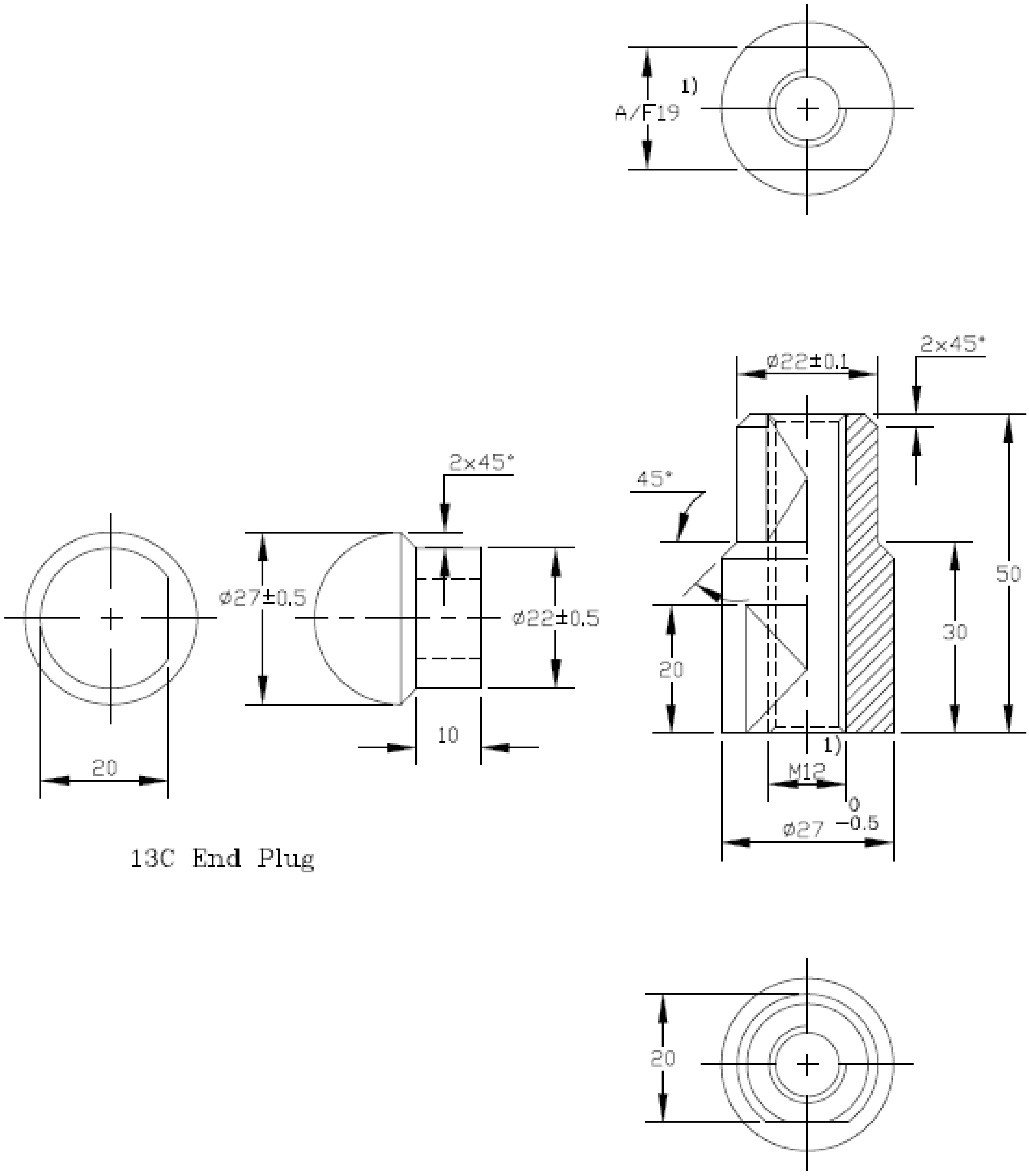


Remove all sharp corners

13B PIPE

All dimensions in millimeters

FIG. 13 HANDLE PARTS (*Continued*)

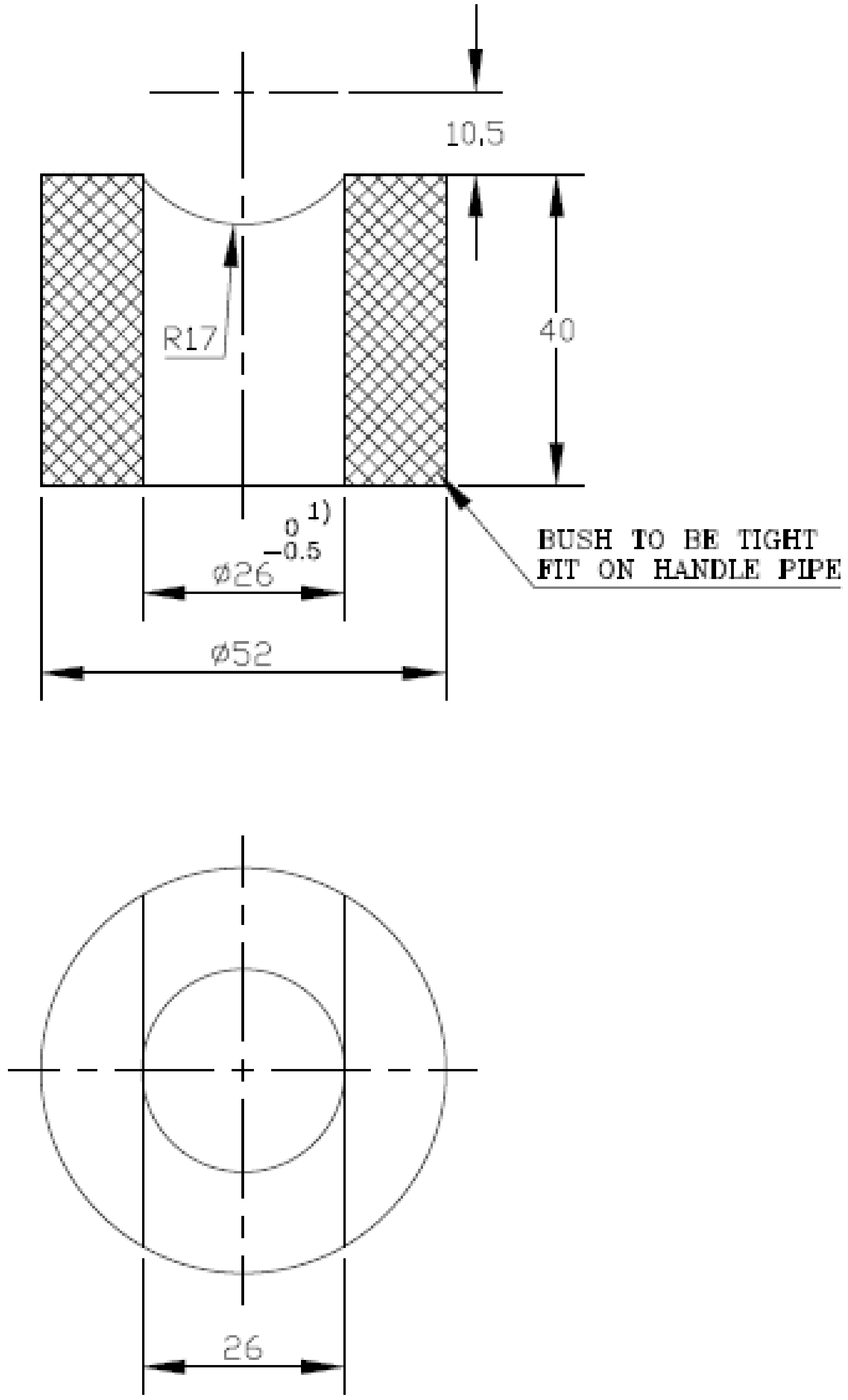


13C End Plug

1) Indicates critical dimensions
13D Handle Nut

All dimensions in millimeters

FIG. 13 HANDLE PARTS

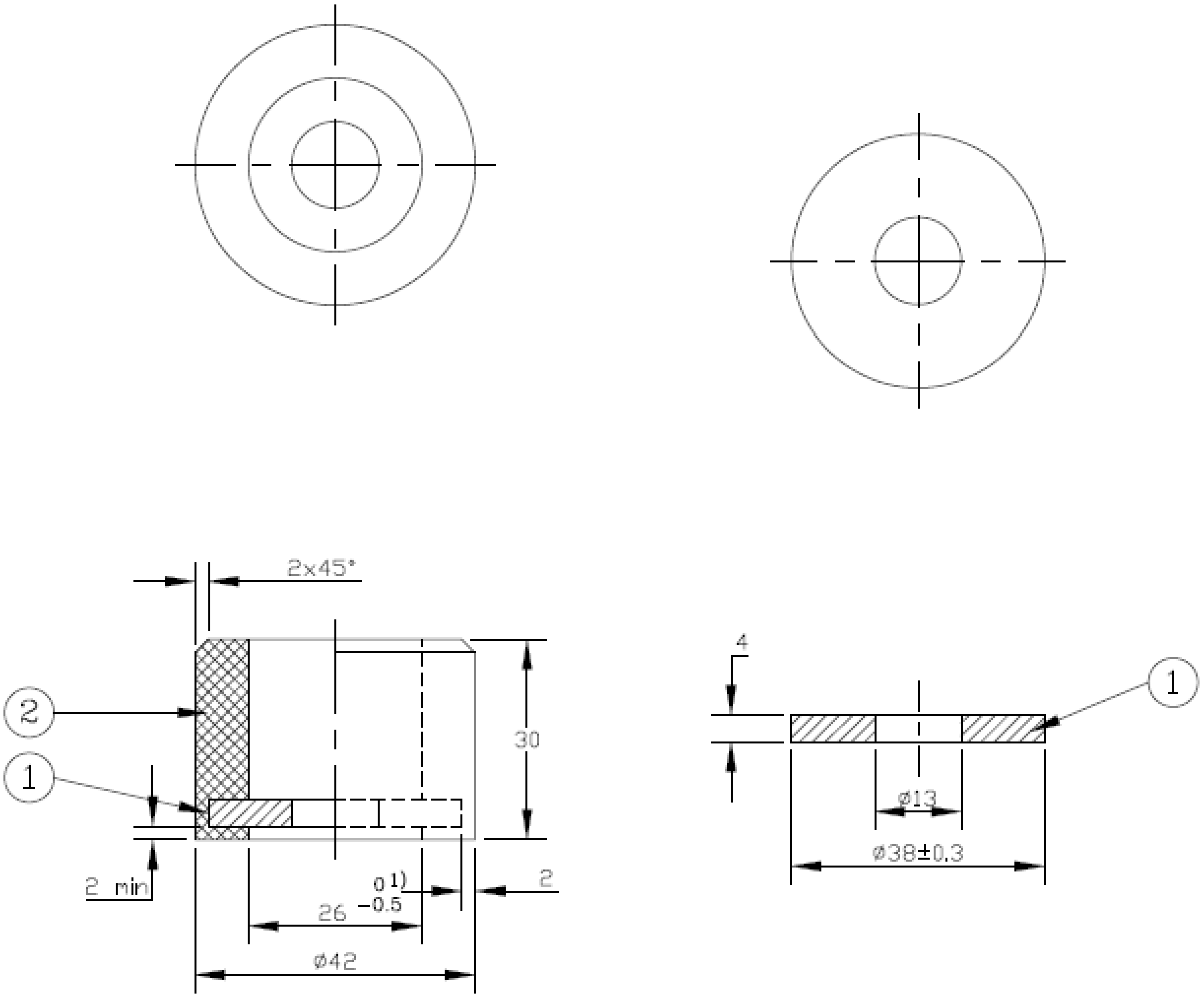


Shore Hardness 65 t0 75 on scale A

1) Indicates critical dimensions

All dimensions in millimeters

FIG. 14 HANDLE CUSHION TOP



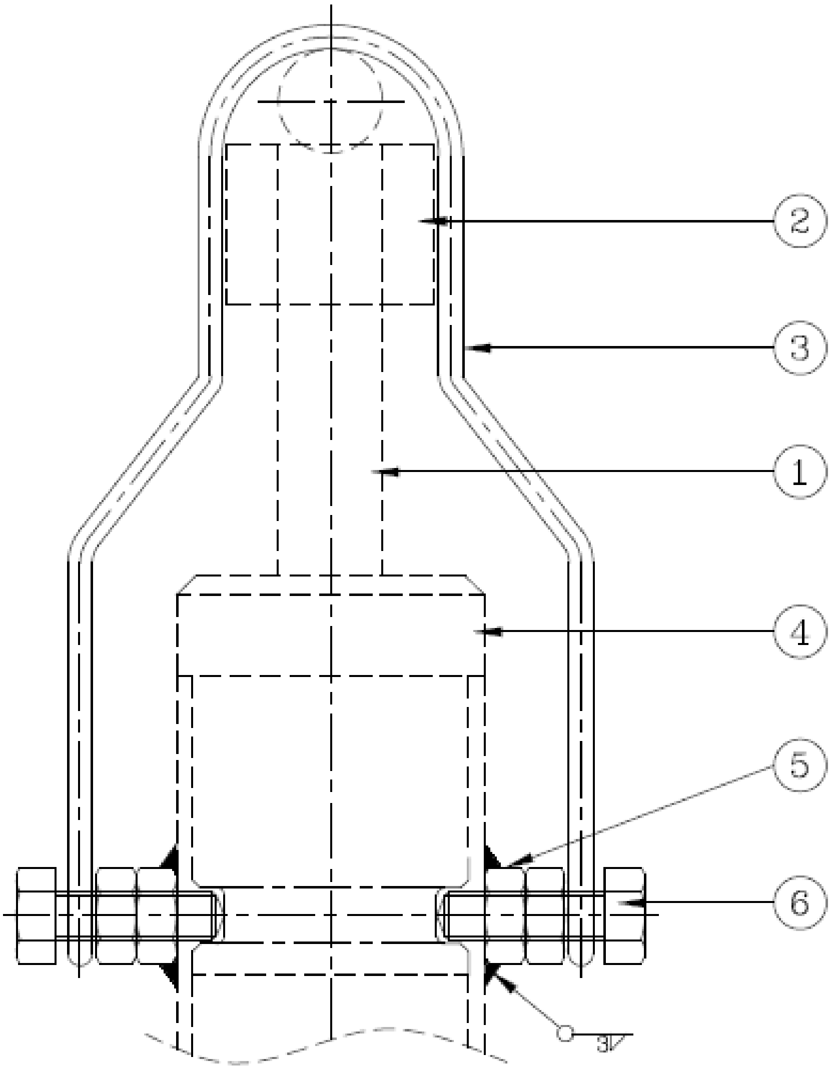
2	1	Bottom cushion	Nitrile rubber
1	1	Washer (Hot dip galvanized)	Grade A of IS 2062:2011
Part No	**No.Off**	**Description**	**Material**

Shore Hardness 65 t0 75 on scale A

1) Indicates critical dimensions

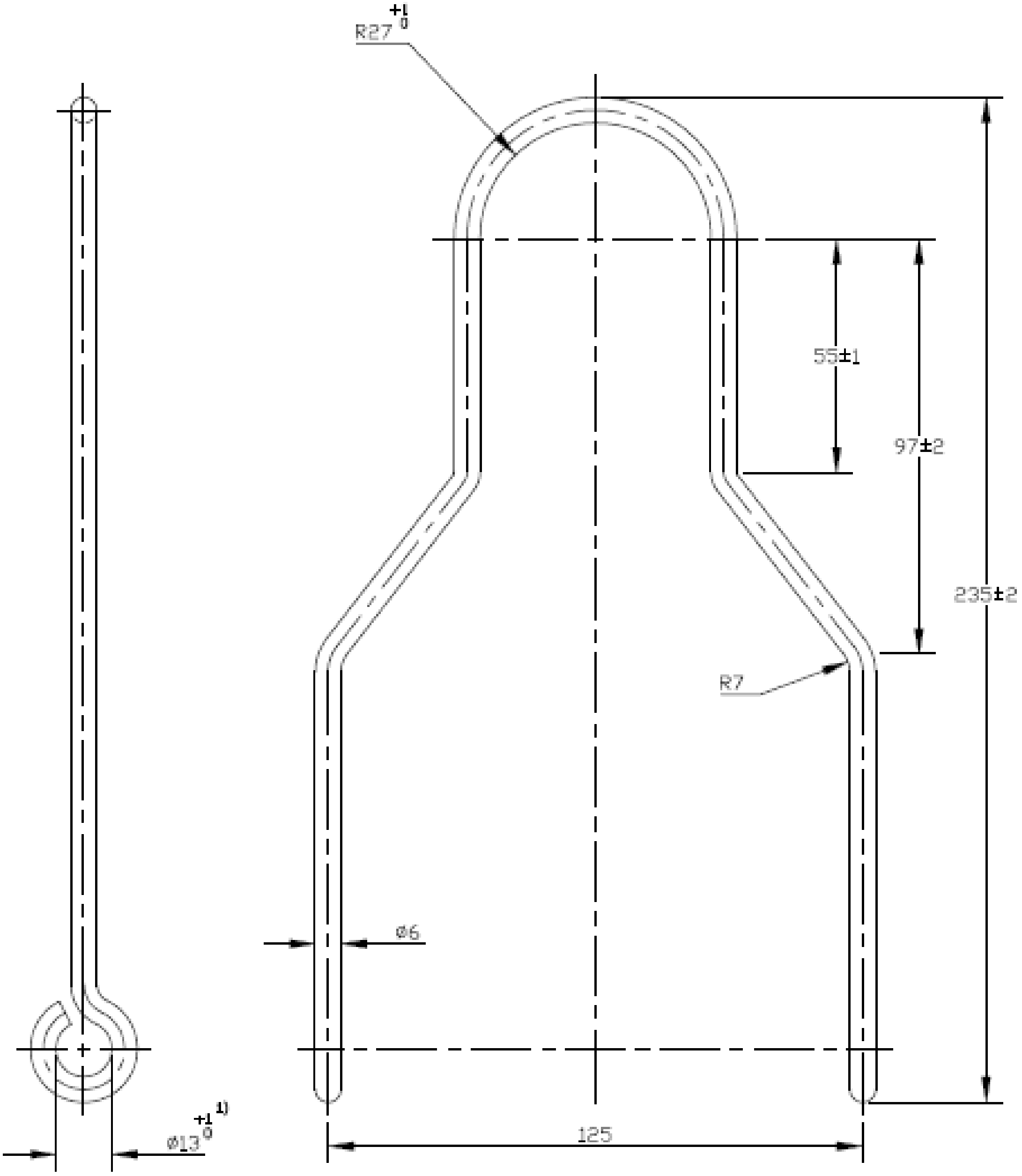
All dimensions in millimeters

FIG. 15 BOTTOME CUSHION



6	2	Hex. screw M12–40mm long	IS 1363 (Part–3) : 2002
5	4	Hex. nut M12	IS 1363 (Part–3) : 2002
4	1	Top guide bush	HDPE
3	1	Handle retainer	Grade SL of IS 4454 : 2001 spring steel
2	1	handle cushion top	Nitrile Rubber
1	1	Handle assembly	IS 1239 (Part–1) : 2004
Part No	**No.Off**	**Description**	**Material**

FIG. 16 HANDLE RETAINER



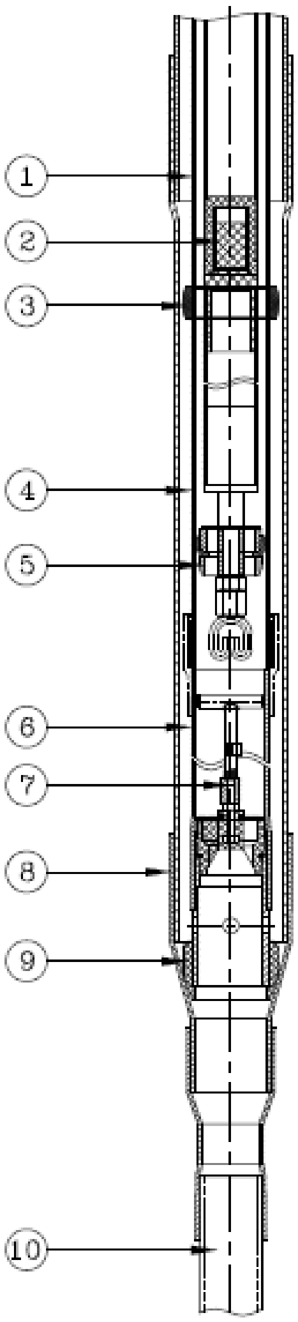
NOTES
1 Cold formed and electrogalvanised.
2 Two eyes to be in the same axis

1) Indicates critical dimensions

17 A Handle Retainer

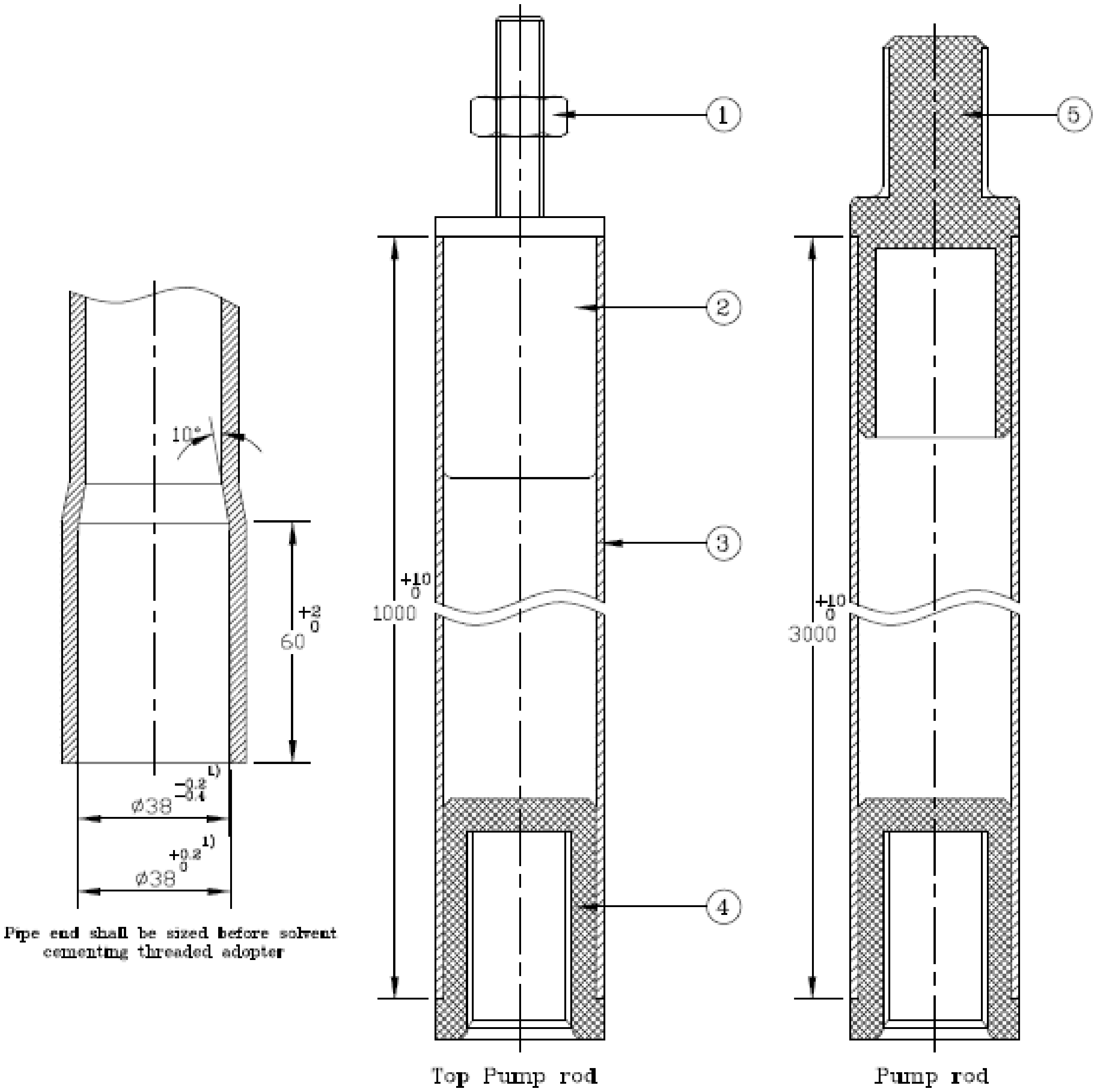
All dimensions in millimeters

FIG. 17 HANDLE RETAINER PARTS



10	–	Lower well casing	uPVC
9	1	Rubber seat	Nitrile rubber
8	1	Reducer socket	uPVC
7	1	Foot valve assembly	
6	1	Cylinder	uPVC
5	1	Piston assembly	
4	–	Threaded coupler	uPVC IS 7834 (PART–1) : 1987
3	–	Pipe centerliser	Nitrile rubber
2	–	Pump rod	uPVC
1	–	Rising main	uPVC
Part No.	**No.Off**	**Description**	**Material**

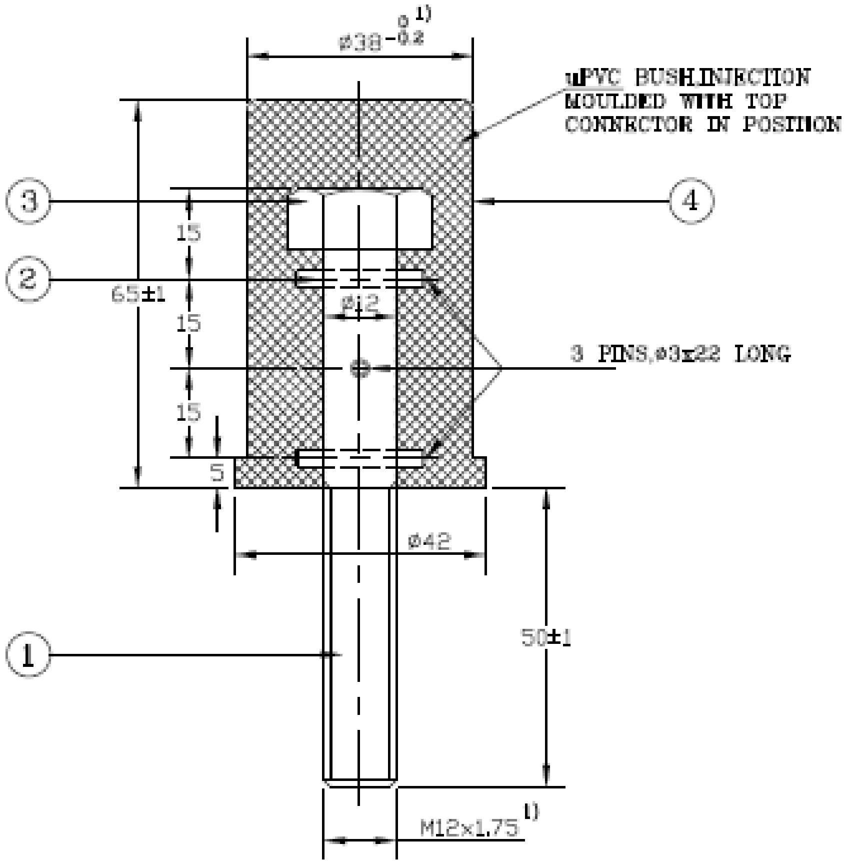
FIG. 18 UPPER WELL ASSEMBLE



Part No.	No.Off	Description	Material
5	1	Threaded adopter (M)	uPVC IS 7834 (PART-1) : 1987
4	1	Threaded adopter (F)	uPVC IS 7834 (PART-1) : 1987
3	1	Pump rod pipe	uPVC
2	1	Top connector	uPVC IS 7834 (PART-1) : 1987
1	1	Check nut M12	IS 1367 (PART-14) : 2002

1) Indicates critical dimensions
All dimensions in millimeters

FIG. 19 PUMP ROD



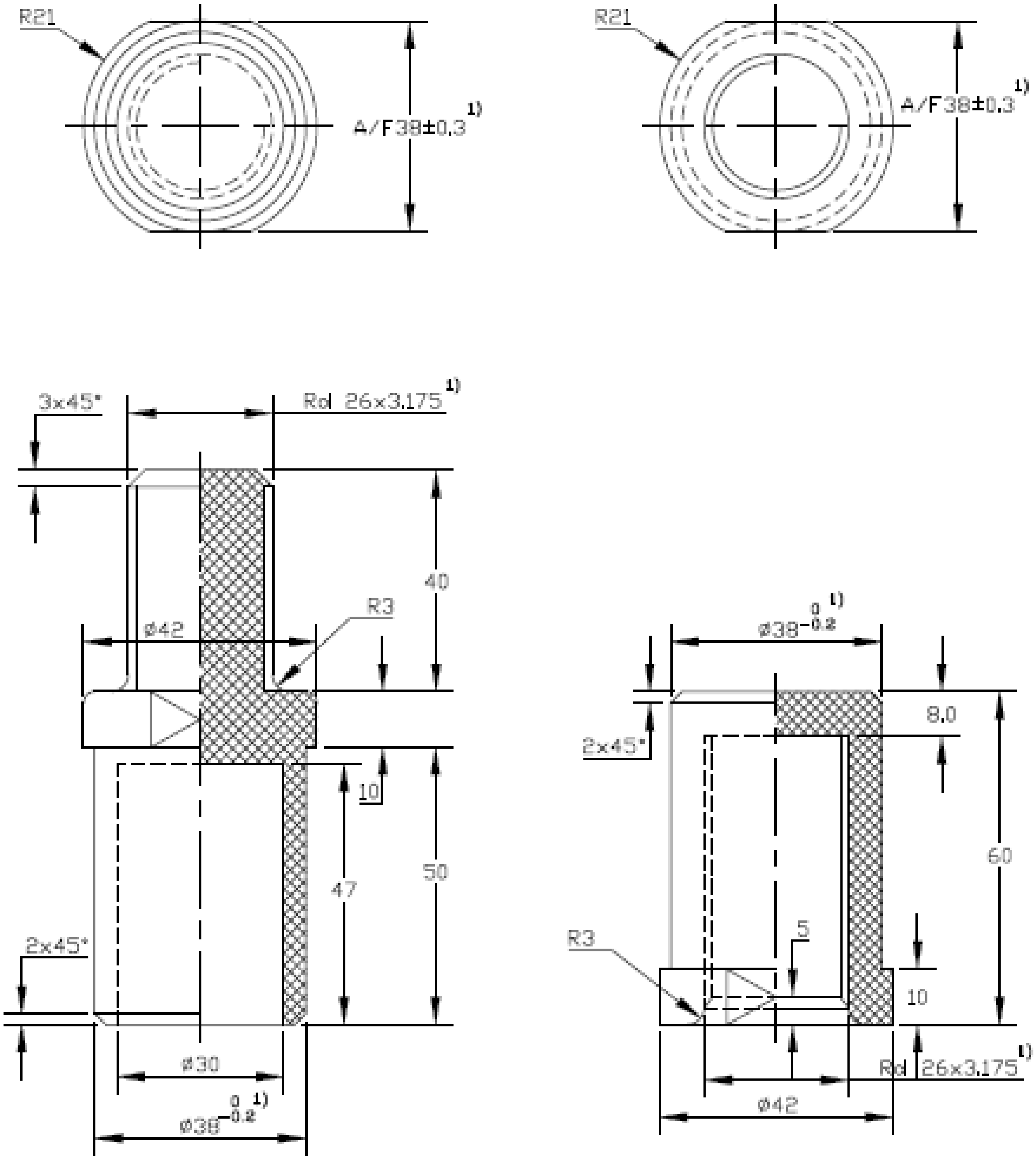
4	1	Bush	uPVC IS 7834 (PART-1) : 1987
3	1	Nut m12	SS04 Cr 19 Ni9 OF IS 6603 : 2001
2	3	Pin	SS04 Cr 19 Ni9 OF IS 6603 : 2001
1	1	Top connector bolt	SS04 Cr 19 Ni9 OF IS 6603 : 2001
Part No	**No.Off**	**Description**	**Material**

NOTES:-

1 Nut to be tack welded with connector bolt.
2 All sharp corners to be removed by smooth filling-radius 2.
3 Out of roundness shall not exceed 0.3
4 Sharp edges of pins to be rounded off.

1) Indicates critical dimensions
20 A TOP CONNECTOR
All dimensions in millimeters

FIG. 20 PUMP ROD PARTS (*Continued*)



1) Indicates critical dimensions

20B Male Adopter

1) Indicates critical dimensions

20C Female Adopter

NOTES

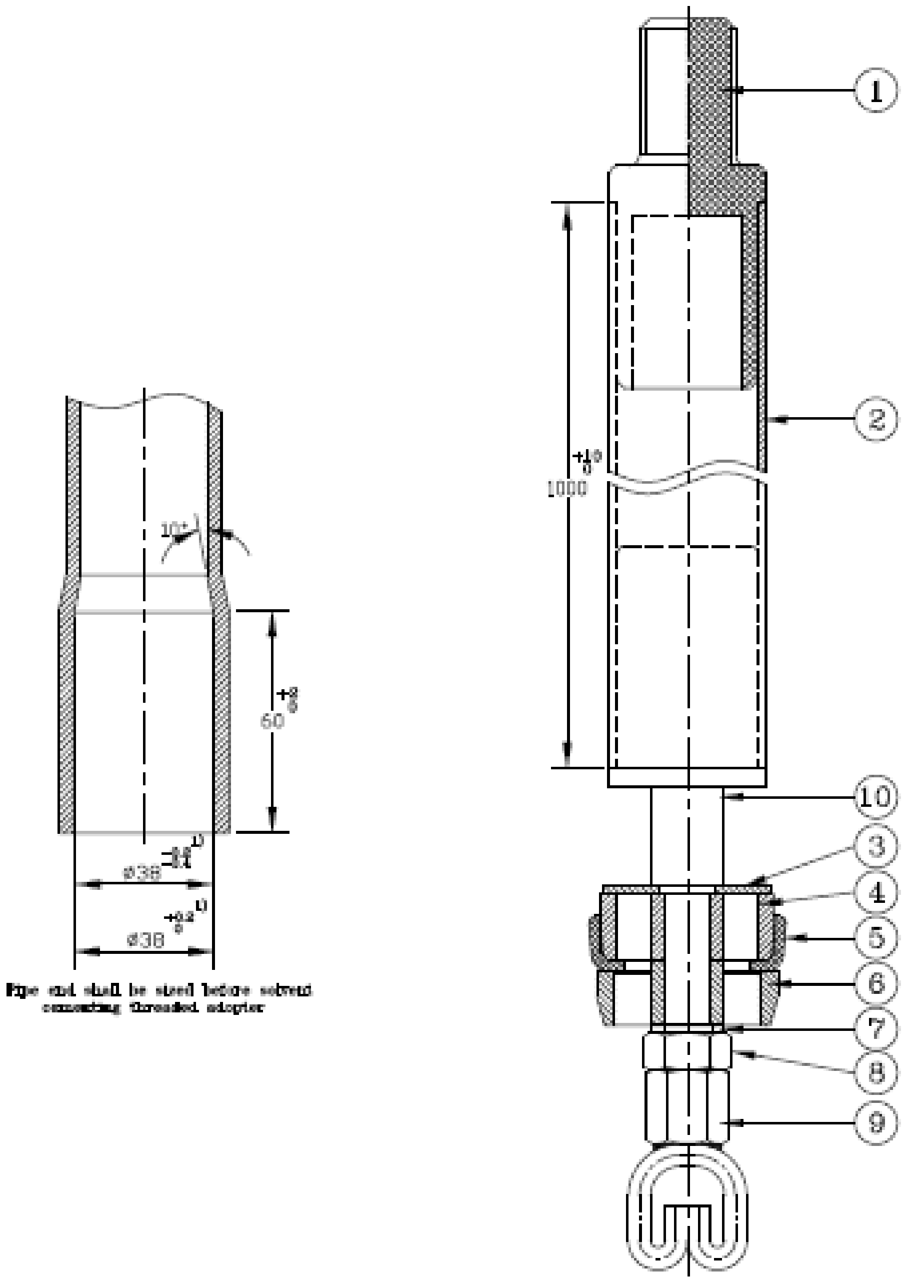
1 All sharp corners to be avoided.

2 Out of roundness shall not exceed 0.3

3 For knuckle screw threads profile , see fig. 28

All dimensions in millimeters

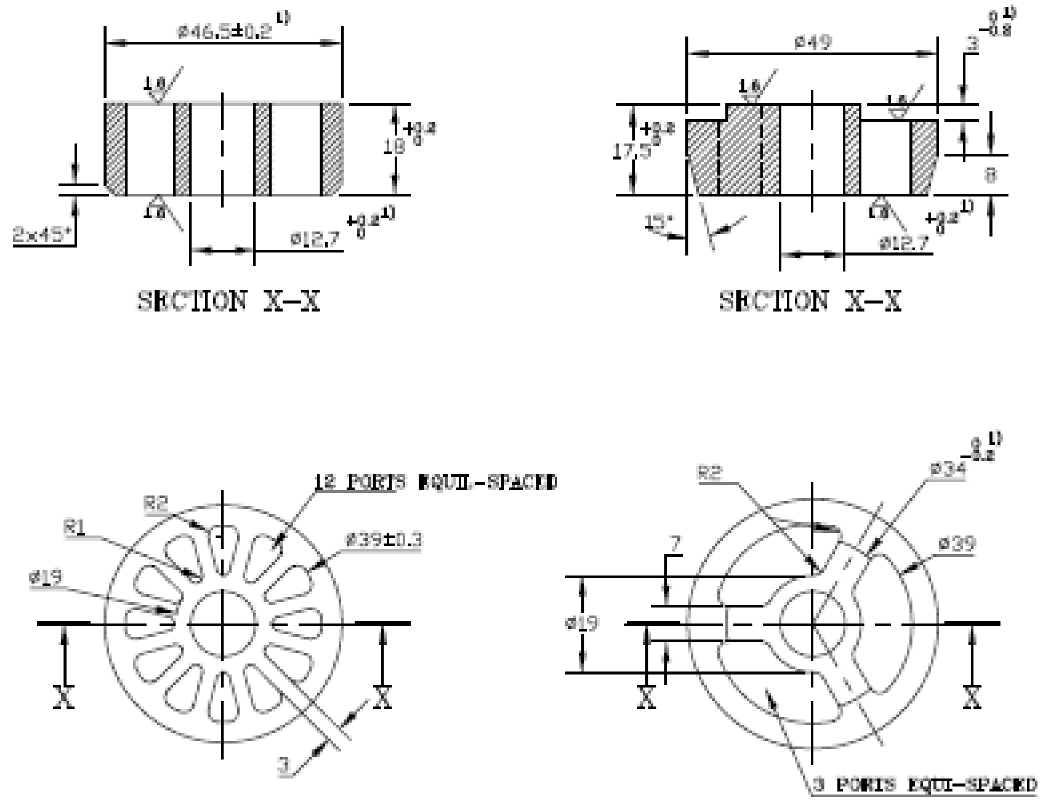
FIG. 20 PUMP ROD PARTS


1
2
3
4
5
6
7
8
9
10
1000 +10/0
10°
60 +2/0
ø38
ø38 +0.2/0
Pipe end shall be sized before solvent connecting threaded adopter

10	1	Bottom connector	
9	1	Grapple	SS 04 Cr19 Ni9 OF IS 6603 : 2001
8	1	Hex nut M12	IS 1367 (PART-14) : 2002
7	1	Washer	SS 04 Cr19 Ni9 OF IS 6603 : 2001
6	1	Follower plate	Polyacetal ,See annex B
5	1	Cup seal	Nitrile Rubber
4	1	Piston plate	Polyacetal ,See annex B
3	1	Piston flap valve	Nitrile Rubber
2	1	Piston rod pipe	uPVC
1	1	Threaded adopter	uPVC IS 7834 (PART-1) : 1987
Part No	No.Off	Description	Material

All dimensions in millimeters

FIG. 21 PISTON ROD ASSEMBLY

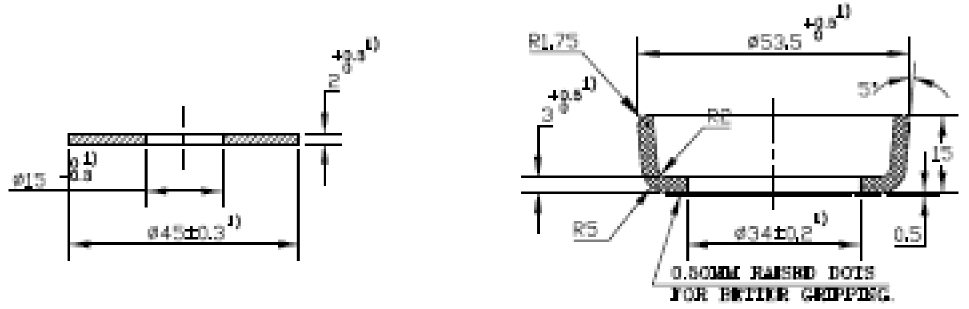


NOTES
1 Top and bottom surface to be smooth
2 All ports to be cleaned.

1) Indicates critical dimensions
22A Piston Plate

1 Top and bottom surface to be smooth
2 All ports to be cleaned.

1) Indicates critical dimensions
22B Follower Plate

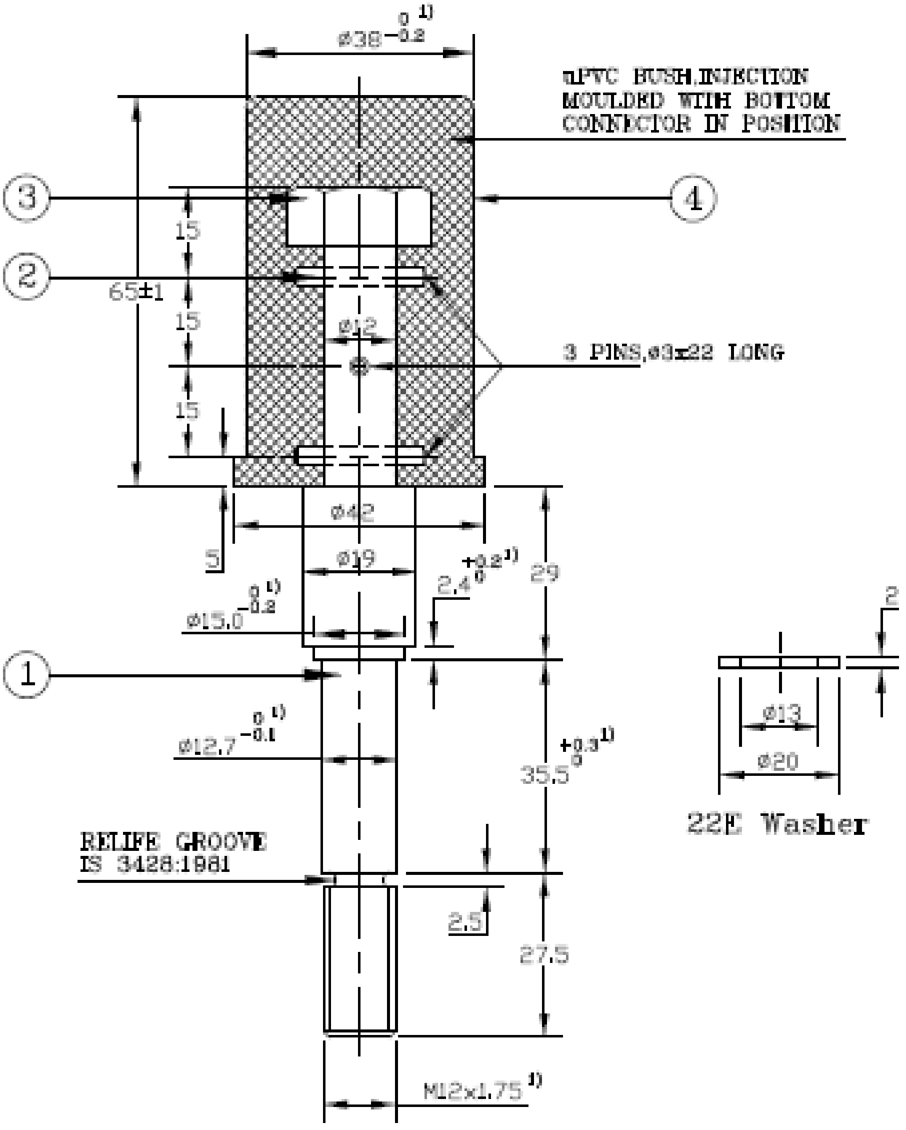


Shore hardness 65 to 75 on scale A
1) Indicates critical dimensions
22C Piston Flap Valve

Shore hardness 75 to 85 on scale A
1) Indicates critical dimensions
22D Cup Seal

All dimensions in millimeters

FIG. 22 PISTON ROD ASSEMBLY PARTS (*Continued*)



22E Washer

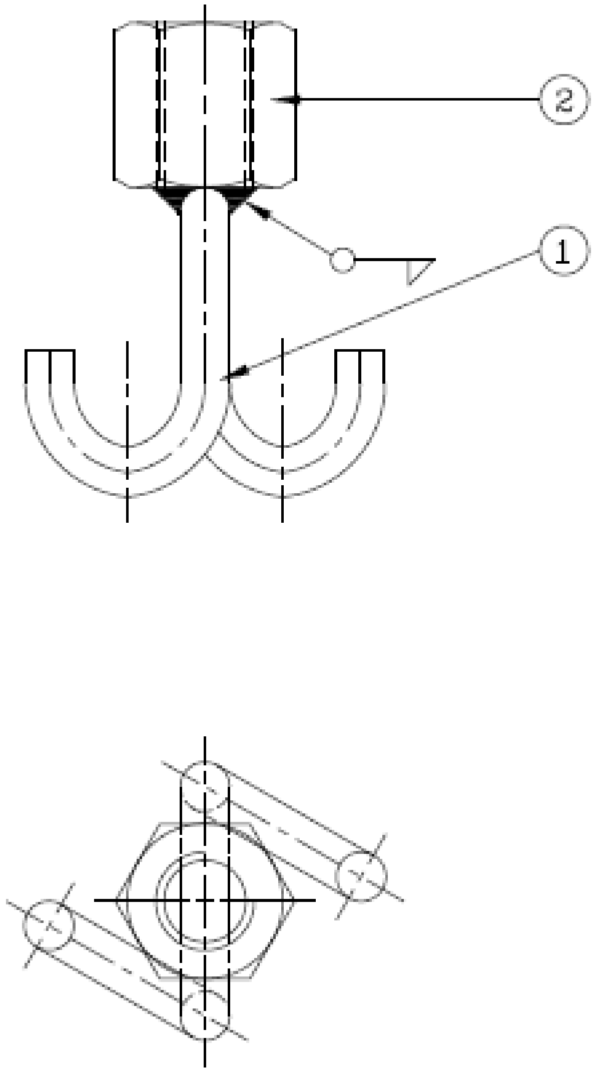
22F Bottom Connector

Part No	No.Off	Description	Material
4	1	Bush	uPVC IS 7834 (PART-1) : 1987
3	1	Nut M12	IS 1367 (PART-14) : 2002
2	3	Pin	SS 04 Cr19 Ni9 OF IS 6603 : 2001
1	1	Bottom connector	SS 04 Cr19 Ni9 OF IS 6603 : 2001

NOTES
1 Nut to be tack welded with connector bolt.
2 All sharp corners to be removed by smooth filling.
3 Out of roundness shall not exceed 0.3
4 Sharp edges of pins to be rounded off.

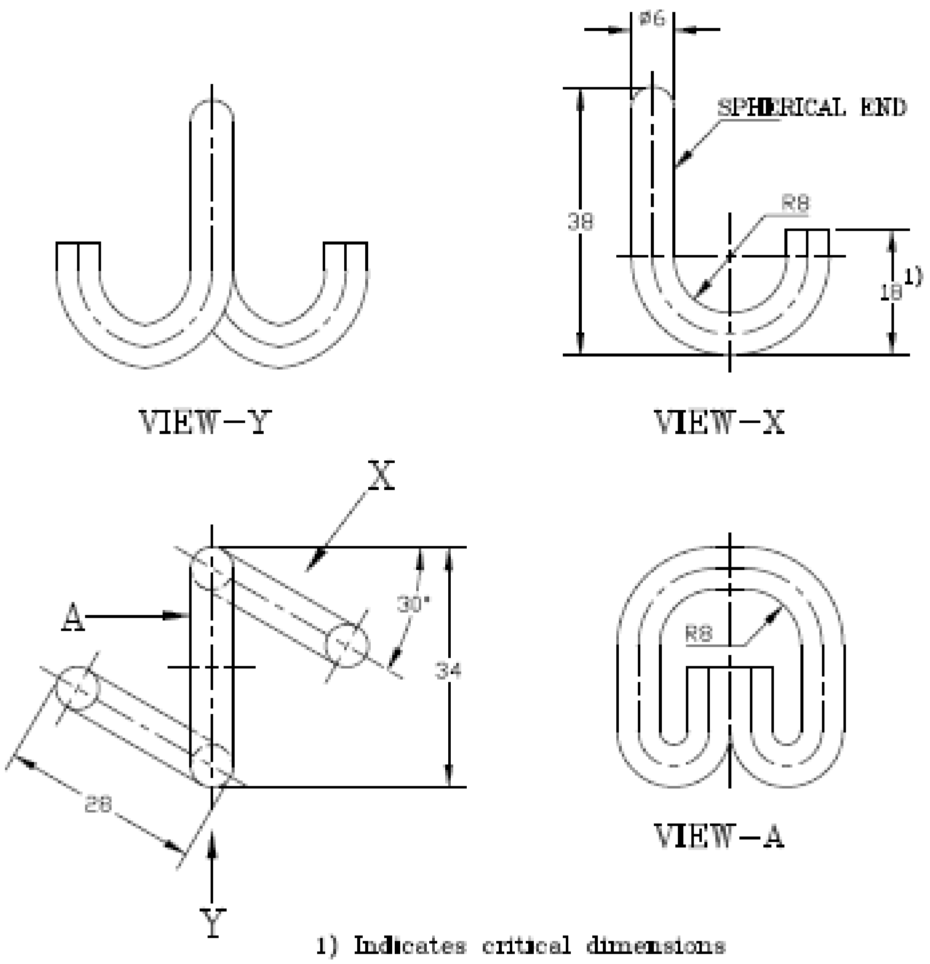
1) Indicates critical dimensions
All dimensions in millimeters

FIG. 22 PISTON ROD ASSEMBLY PARTS

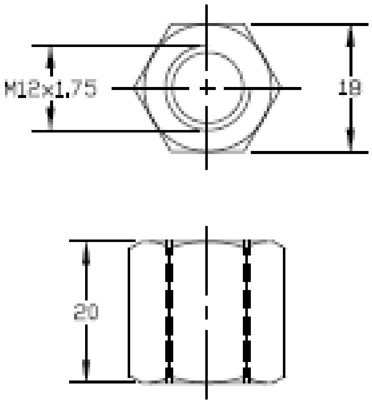


2	1	Grapple coupling M12-20mm long	IS 1367 (PART-14) : 2002
1	1	Hook	SS04 Cr19 Ni9 OF IS 6603 : 2001
Part No	No.Off	Description	Material

FIG. 23 GRAPPLE

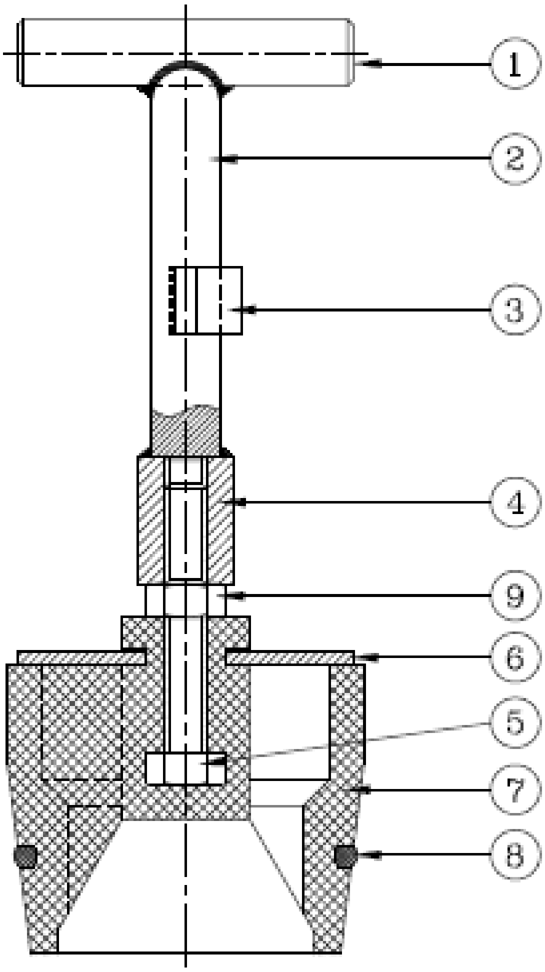


1) Indicates critical dimensions
24A Hook



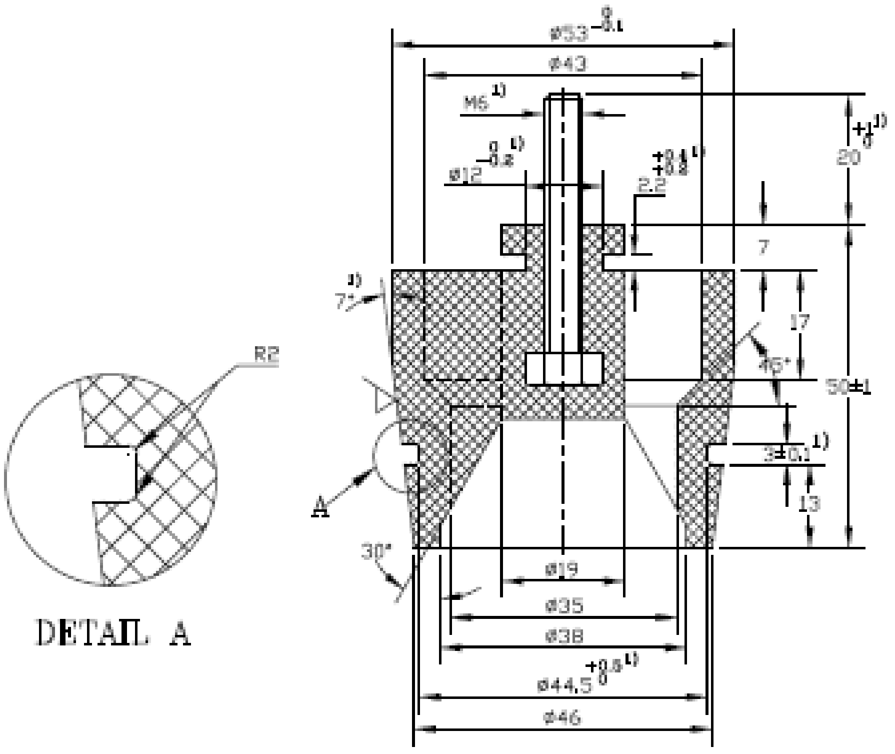
1) Indicates critical dimensions
24B Grapple Coupling
All dimensions in millimeters

FIG. 24 GRAPPLE PARTS

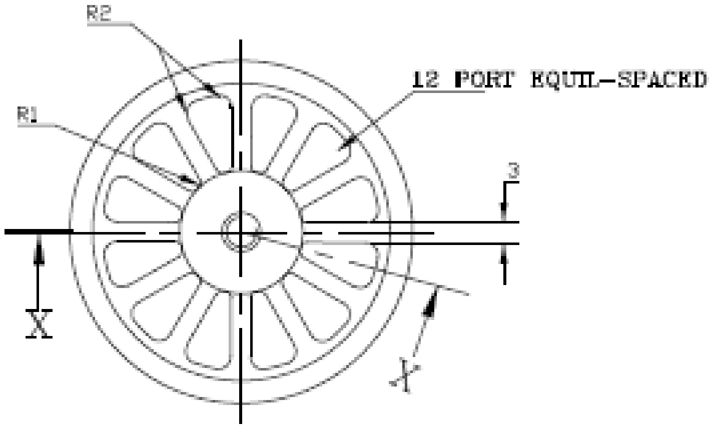


9	1	Check nut M6 (S.S)	IS 1367 (PART-14) : 2002
8	1	'O' ring	Nitrile rubber
7	1	Foot valve body	HDPE
6	1	Flap valve	Nitrile rubber
5	1	Hex. bolt M6	IS 1367 (PART-14) : 2002
4	1	Foot valve guide bush	SS 04 Cr19 Ni9 OF IS 6603 : 2001
3	1	Guide	SS 04 Cr19 Ni9 OF IS 6603 : 2001
2	1	Guide rod	SS 04 Cr19 Ni9 OF IS 6603 : 2001
1	1	Rod	SS 04 Cr19 Ni9 OF IS 6603 : 2001
Part No	**No.Off**	**Description**	**Material**

FIG. 25 FOOT VALVE ASSEMBLY



SECTION X-X



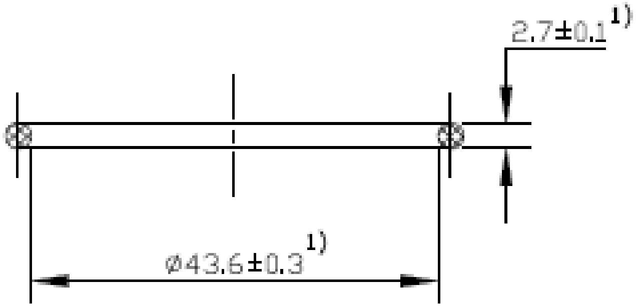
NOTE–Bolt M6–40mm long to be positioned in die during Moulding.
It shall be vertical to the flap valve surface

1) Indicates critical dimensions

26A Foot Valve Body

All dimensions in millimeters

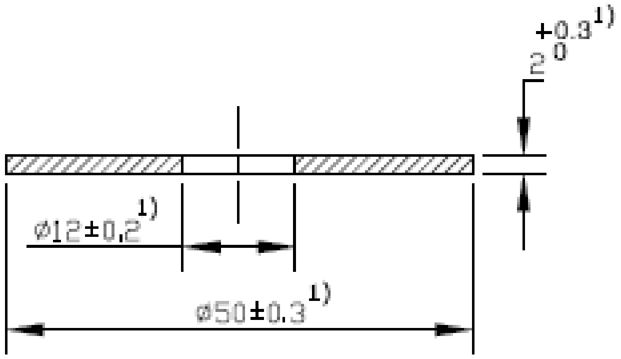
FIG. 26 FOOT VALVE ASSEMBLY PARTS (*Continued*)



Shore Hardness 65 tO 75 on scale A

1) Indicates critical dimensions

26B 'O' Ring



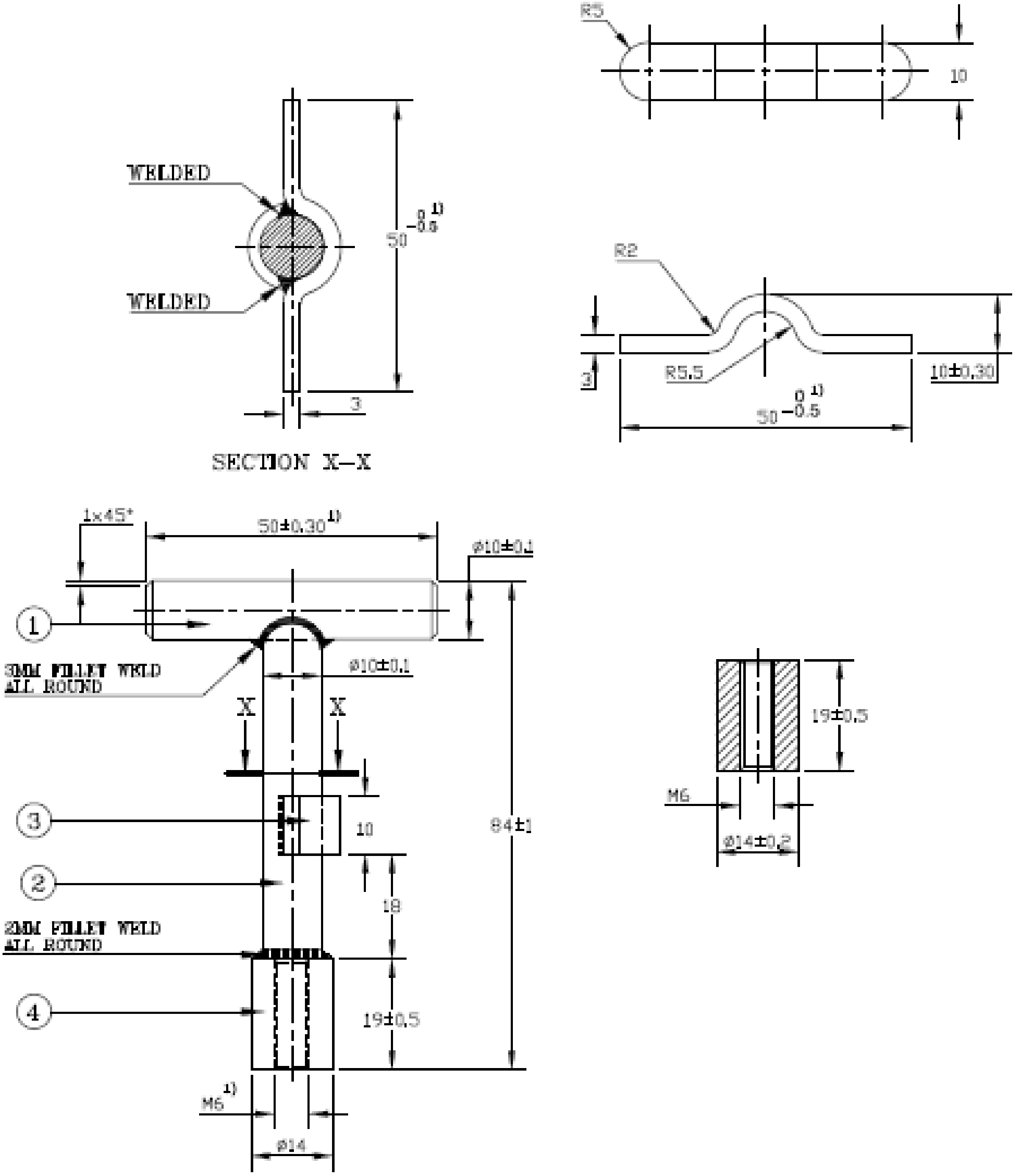
Shore Hardness 65 tO 75 on scale A

1) Indicates critical dimensions

26C Flap Valve

All dimensions in millimeters

FIG. 26 FOOT VALVE ASSEMBLY PARTS (*Continued*)

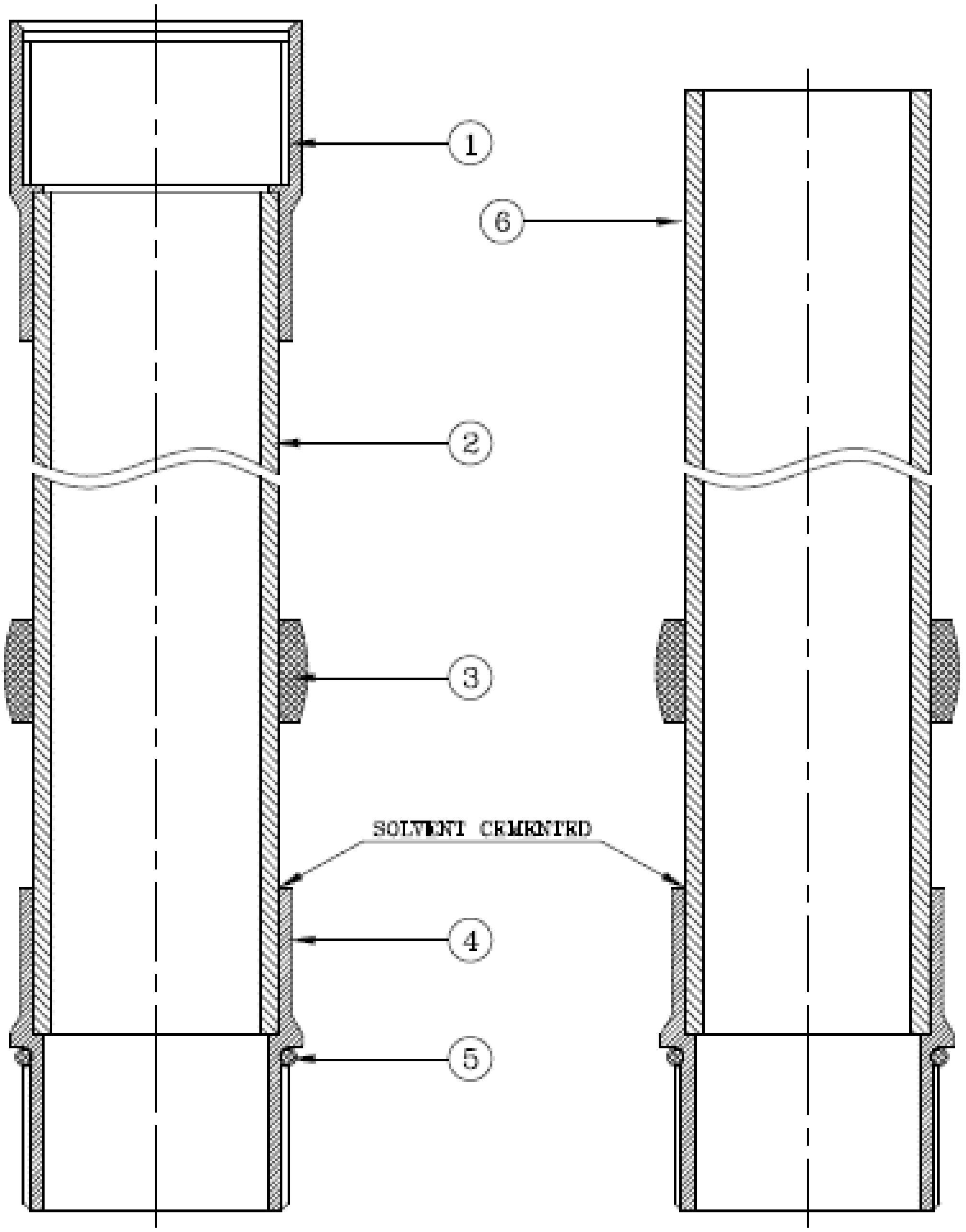


1) Indicates critical dimensions

26D Foot Valve Guide

All dimensions in millimeters

FIG. 26 FOOT VALVE ASSEMBLY PARTS



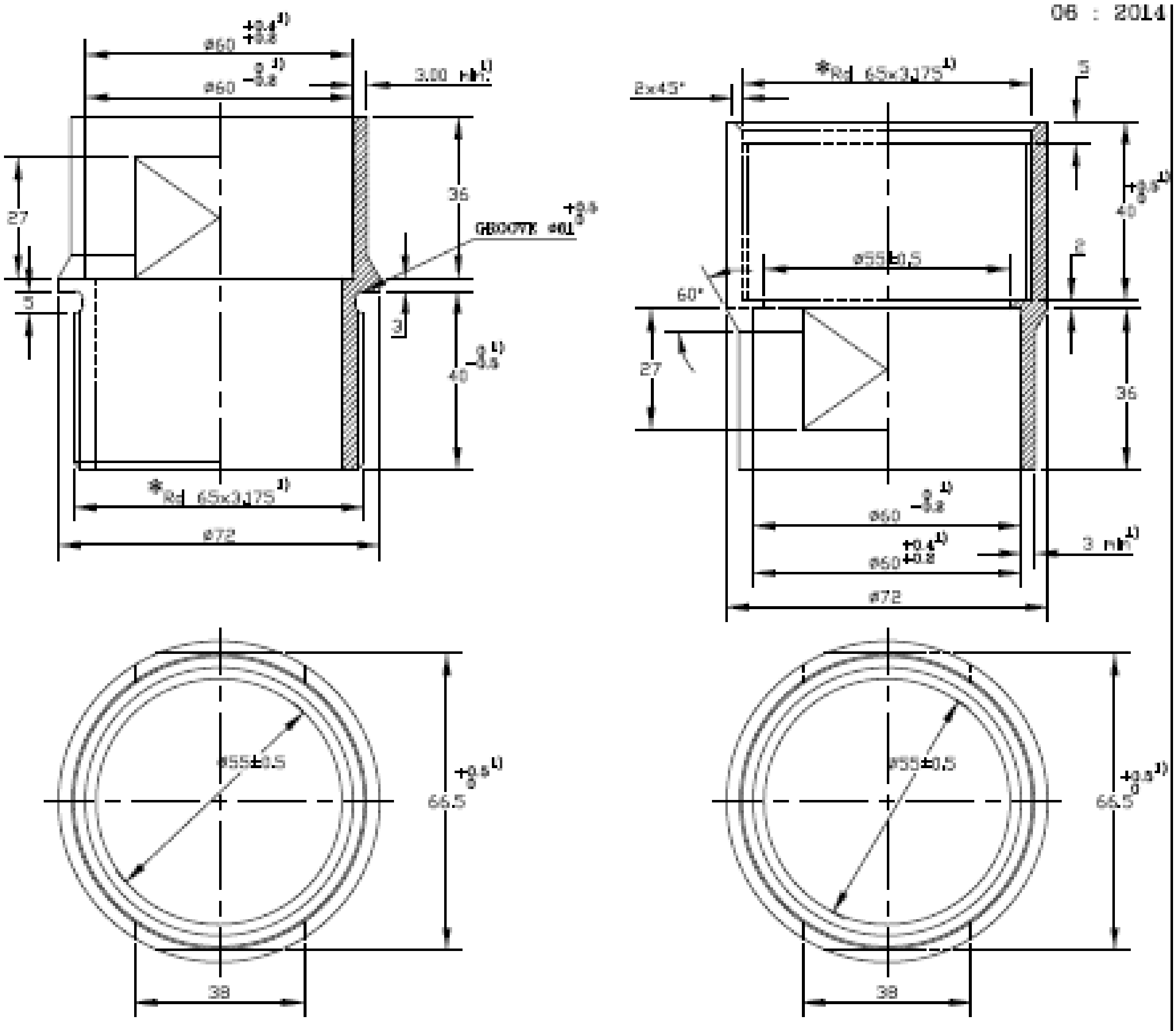
6	1	Rising main (Top)	uPVC
5	1	'O' ring	Nitrile rubber
4	1	Threaded adopter (M)	uPVC IS 7834 (PART –1) : 1987
3	1	Centralizer	Nitrile rubber
2	1	Rising main pipe	uPVC
1	1	Threaded adopter (F)	uPVC IS 7834 (PART –1) : 1987
Part No	**No Off**	**Description**	**Material**

NOTE :– Centralizer to be fixed in place before solvent cementing threaded coupler

1) Indicates critical dimensions

All dimensions in millimeters

FIG. 27 RISING MAIN

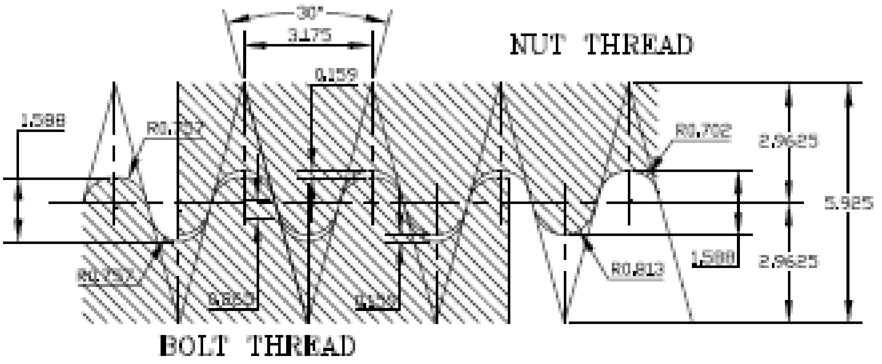


1) Indicates critical dimensions

28A Threaded coupler (M)

1) Indicates critical dimensions

28B Threaded coupler (F)

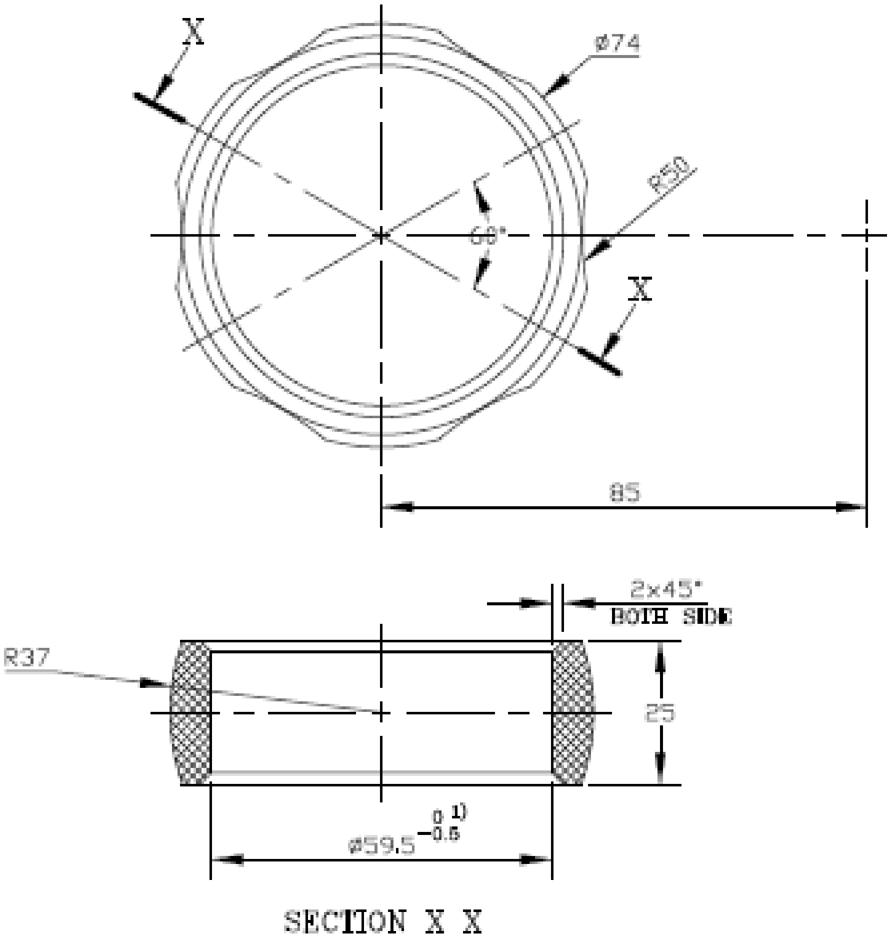


NOMINAL SIZE		MAJOR DIAMETER		MINOR DIAMETER		PITCH DIAMETER	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Rd 26	Nut	26.4	27.0	23.2	23.9	24.41	24.80
Rd 26	Bolt	25.4	25.9	22.3	22.7	24.00	24.35
Rd 65	Nut	65.4	66.0	62.2	62.9	63.41	63.80
Rd 65	Bolt	64.4	64.9	61.3	61.7	63.00	63.35

* Threads profile of knuckle screw threads

All dimensions in millimeters

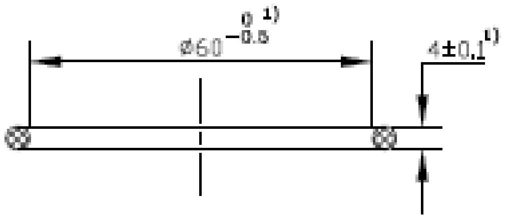
FIG. 28 RISING MAIN PARTS (*Continued*)



Shore Hardness 75 to 85 on scale A

1) Indicates critical dimensions

28C RISER PIPE CENTRALIZER



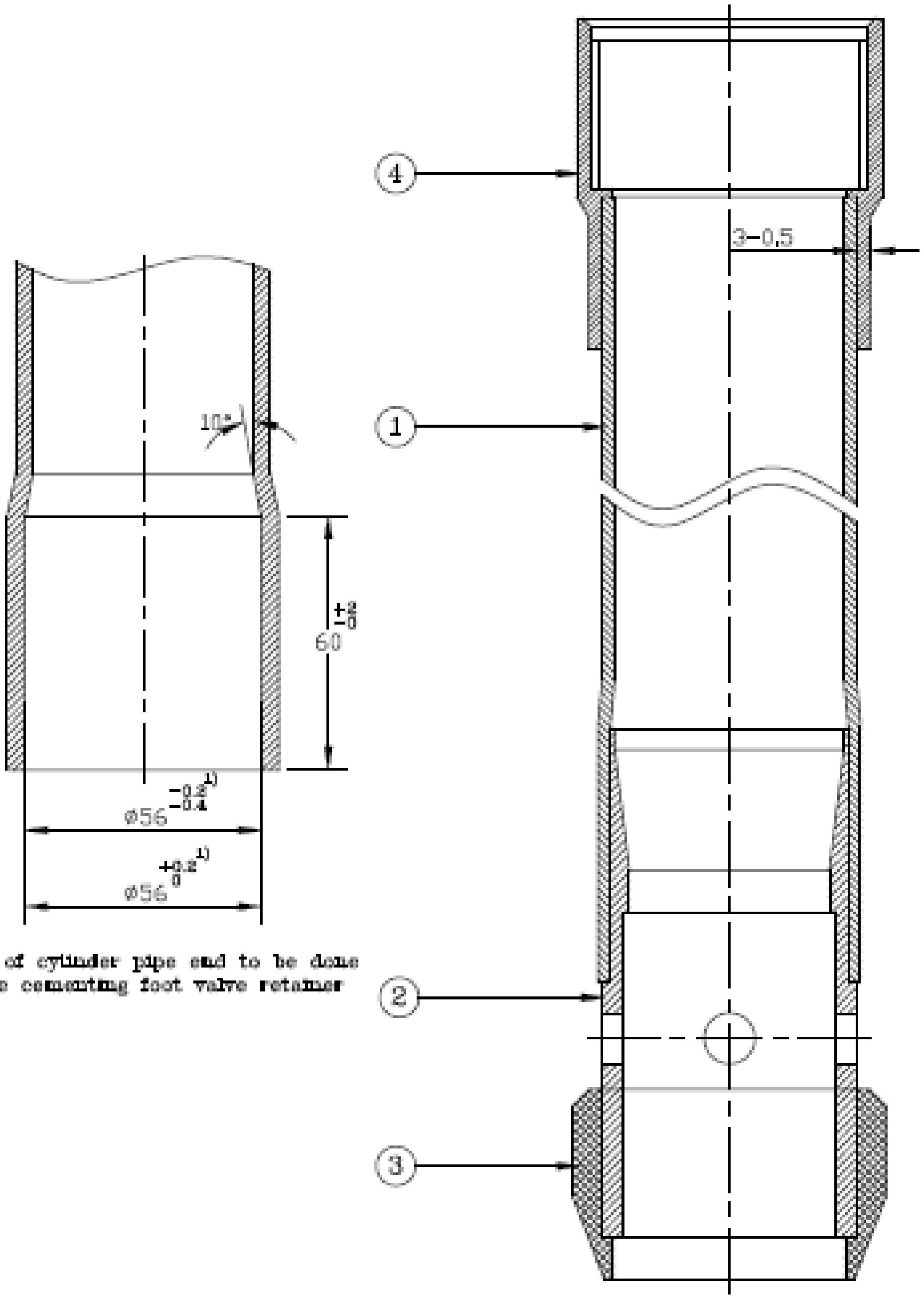
Shore Hardness 65 to 75 on scale A

1) Indicates critical dimensions

28D 'O' Ring

All dimensions in millimeters

FIG. 28 RISING MAIN PARTS

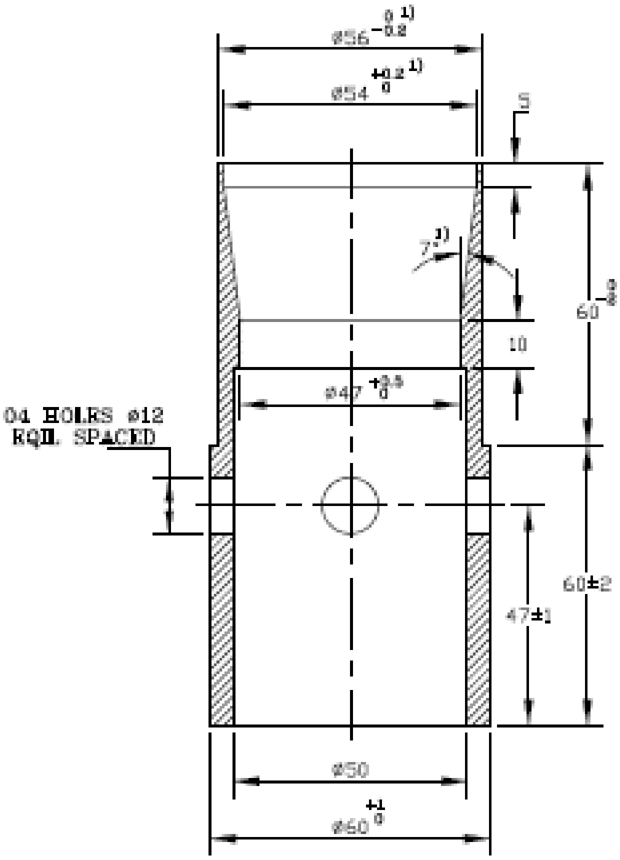


Sizing of cylinder pipe end to be done before cementing foot valve retainer

4	1	Threaded adopter (F)	uPVC IS 7834 (PART-1) : 1987
3	1	Rubber seat	Nitrile rubber
2	1	Foot valve retainer	uPVC IS 7834 (PART-1) : 1987
1	1	Cylinder pipe	uPVC
Part No	**No.Off**	**Description**	**Material**

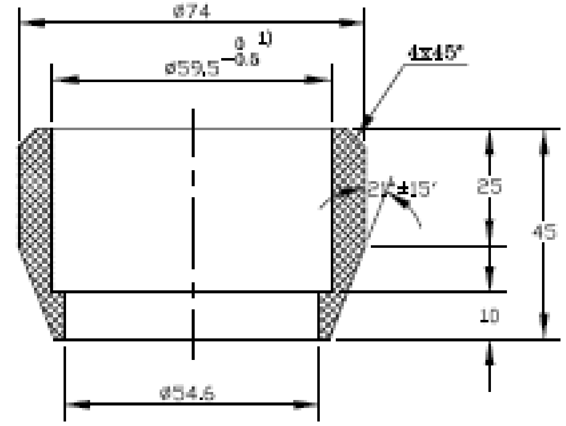
1) Indicates critical dimensions
All dimensions in millimeters

FIG. 29 CYLINDER PIPE



1) Indicates critical dimensions

30A Foot Valve Retainer



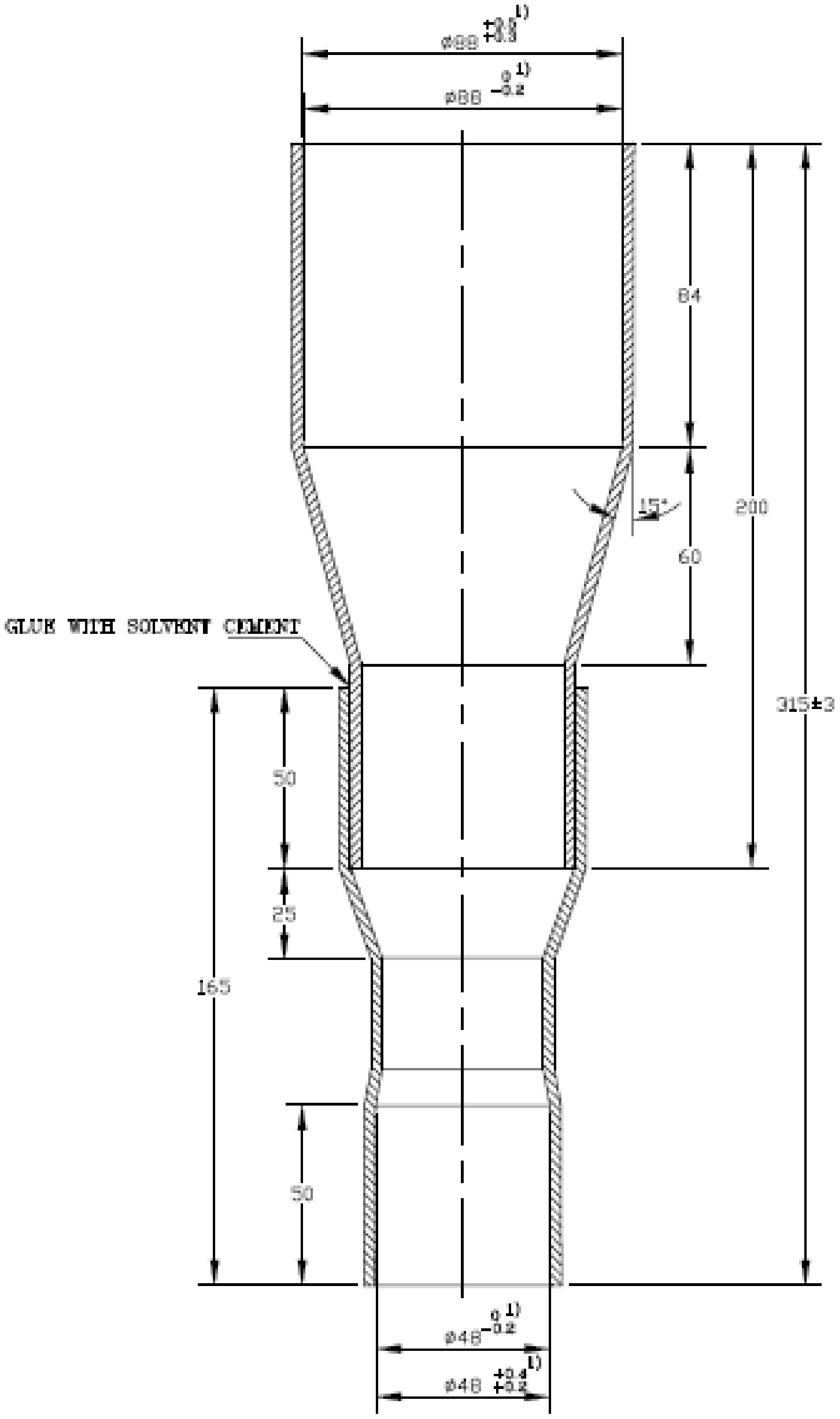
NOTES
1 To be Fixed with suitable adhesive
2 Shore hardness 75 to 85 on scale A

1) Indicates critical dimensions

30B RUBBER SEAT

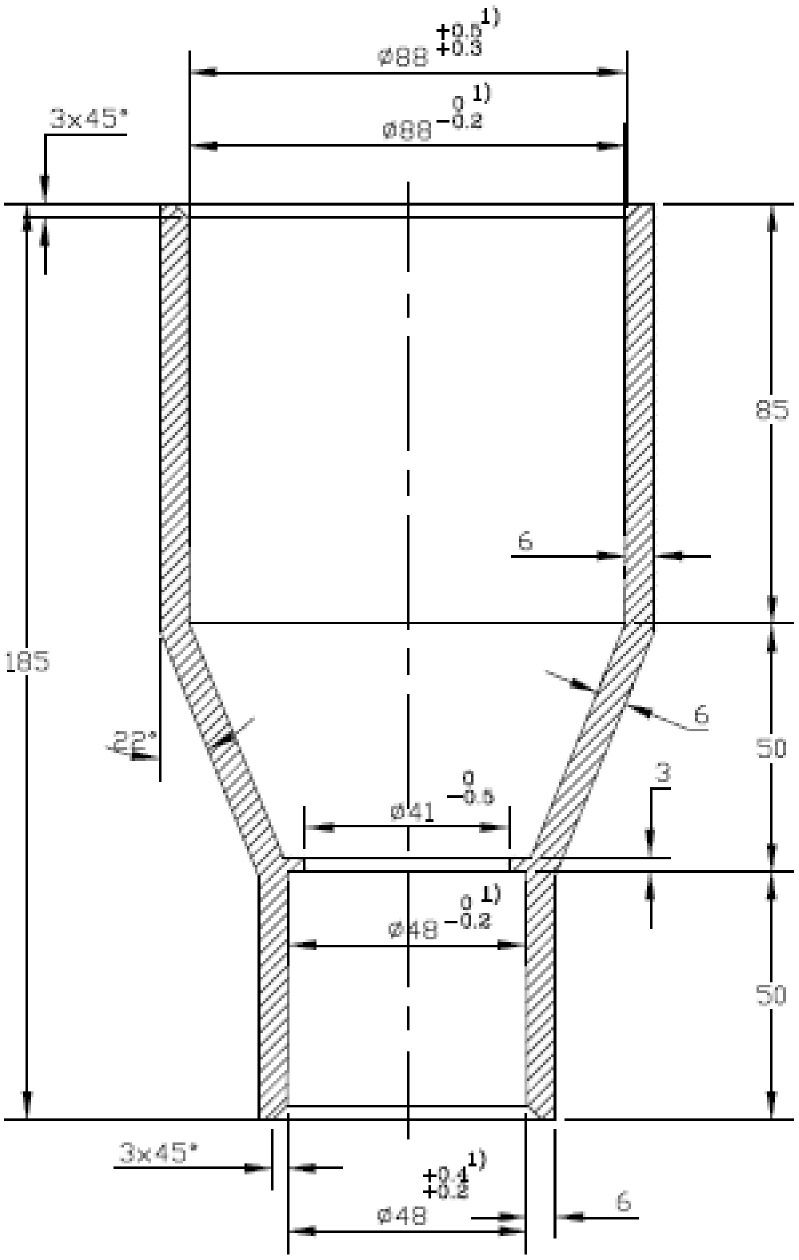
All dimensions in millimeters

FIG. 30 CYLINDER PIPE PARTS



1) Indicates critical dimensions
All dimensions in millimeters

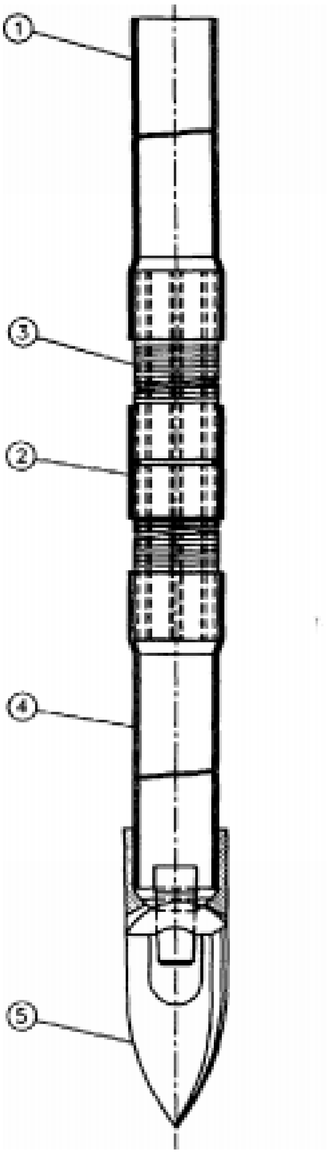
FIG. 31 REDUCING SOCKET



1) Indicates critical dimensions

All dimensions in millimeters

FIG. 31 REDUCING SOCKET (ALTERNATE DESIGN)



5	1	Cutler plug	Grade FG 150 of IS 210: 1993
4	1	Sand trap	uPVC
3	2	Well screen	uPVC
2	1	Screen coupler	uPVC IS 7834 (Part 1) : 1987
1	1	Lower well casing	uPVC
Part No.	**No. Off**	**Description**	**Material**

FIG 32 LOWER WELL ASSEMBLY

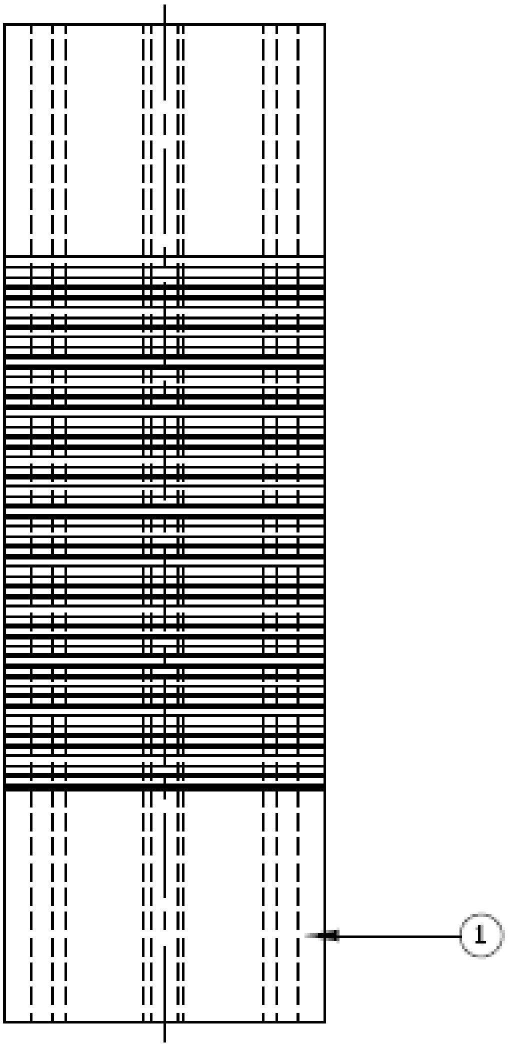
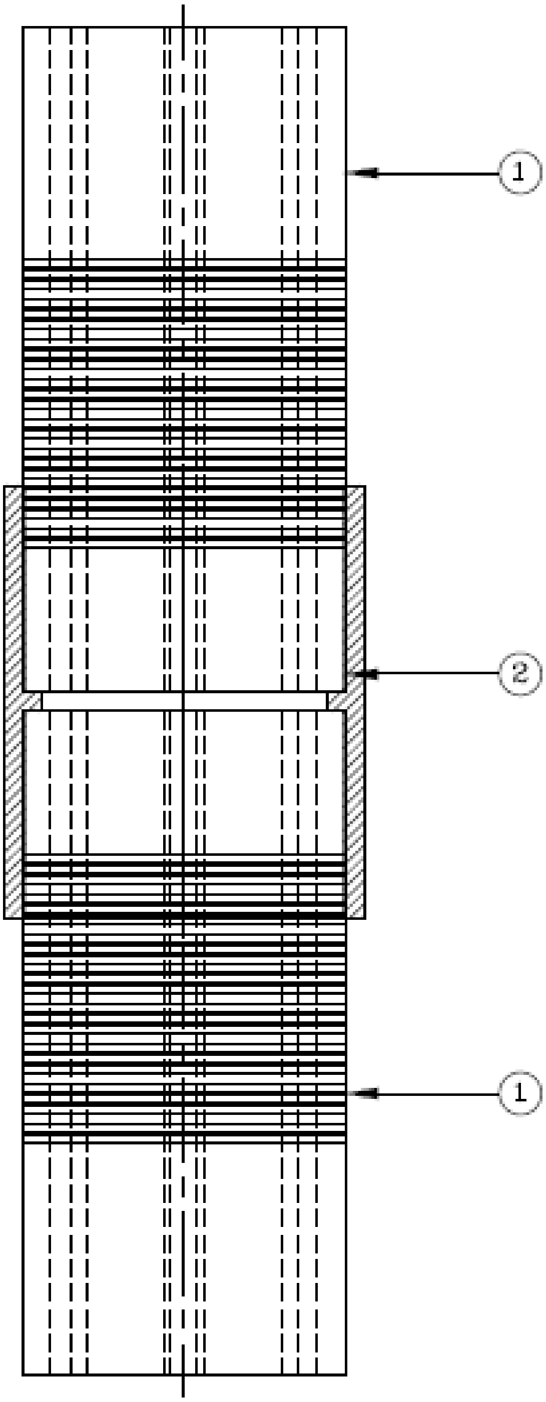


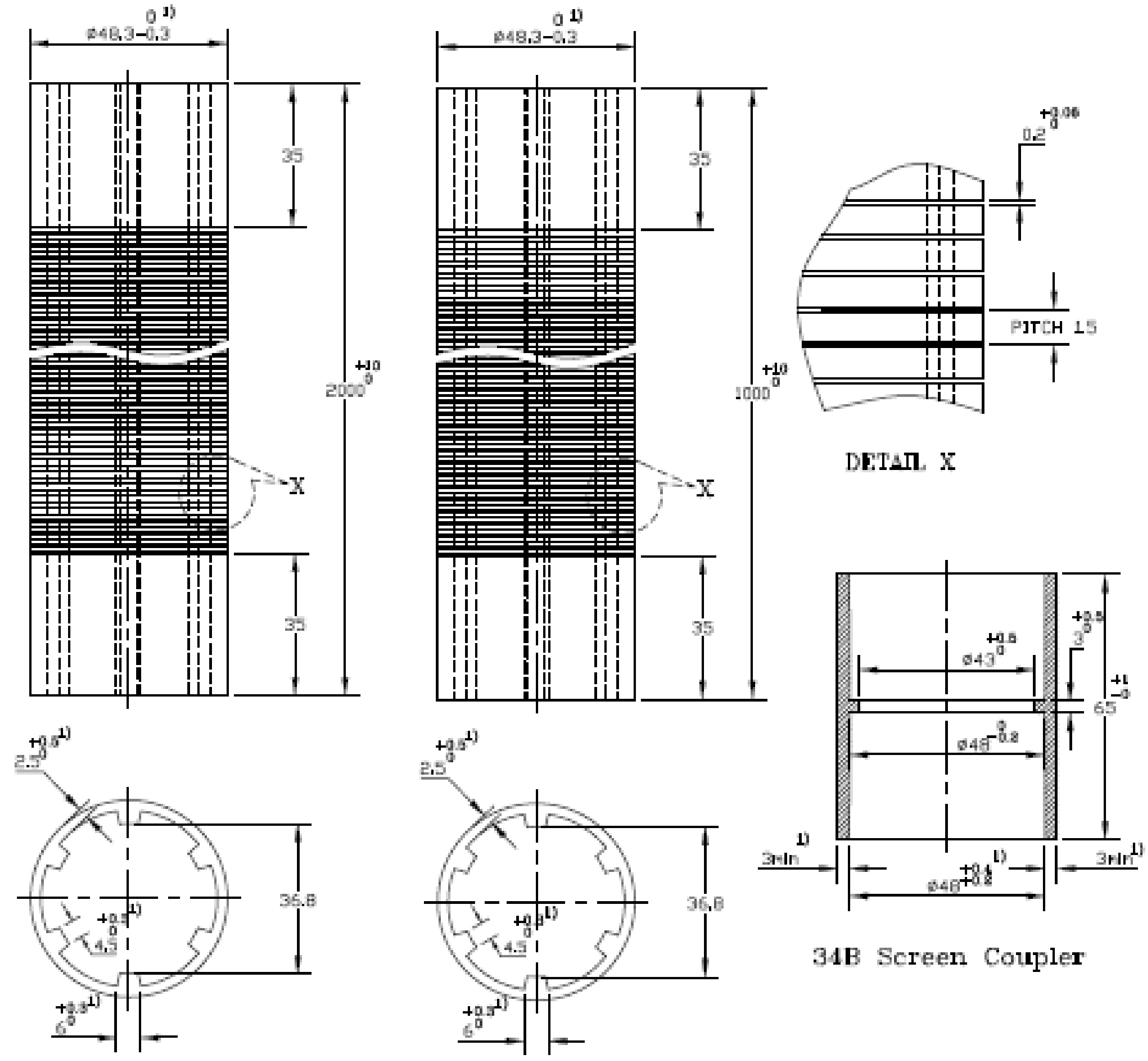
FIG. 33A WELL SCREEN (ALTERNATE)



NOTE — For tubewell depth beyond 50m, screen as per IS 12818 : 2010 to be used.

2	1	Screen coupler	uPVC IS 7834 (Part 1) : 1987
1	2	Well screen	uPVC
Part No	**No.Off**	**Description**	**Material**

FIG. 33 WELL SCREEN



Well Screen(Alternate)

NOTES

1 Depth of cut to penetrate pipe wall fully

2 Penetration into rib not to exceed 0.2mm.

3 The diameter $\phi 48.3^{0\,1)}_{-0.3}$ is the mean outside diameter of the well screen

1) Indicates critical dimensions

FIG. 34A Well Screen

All dimensions in millimeters

FIG. 34 WELL SCREEN PARTS

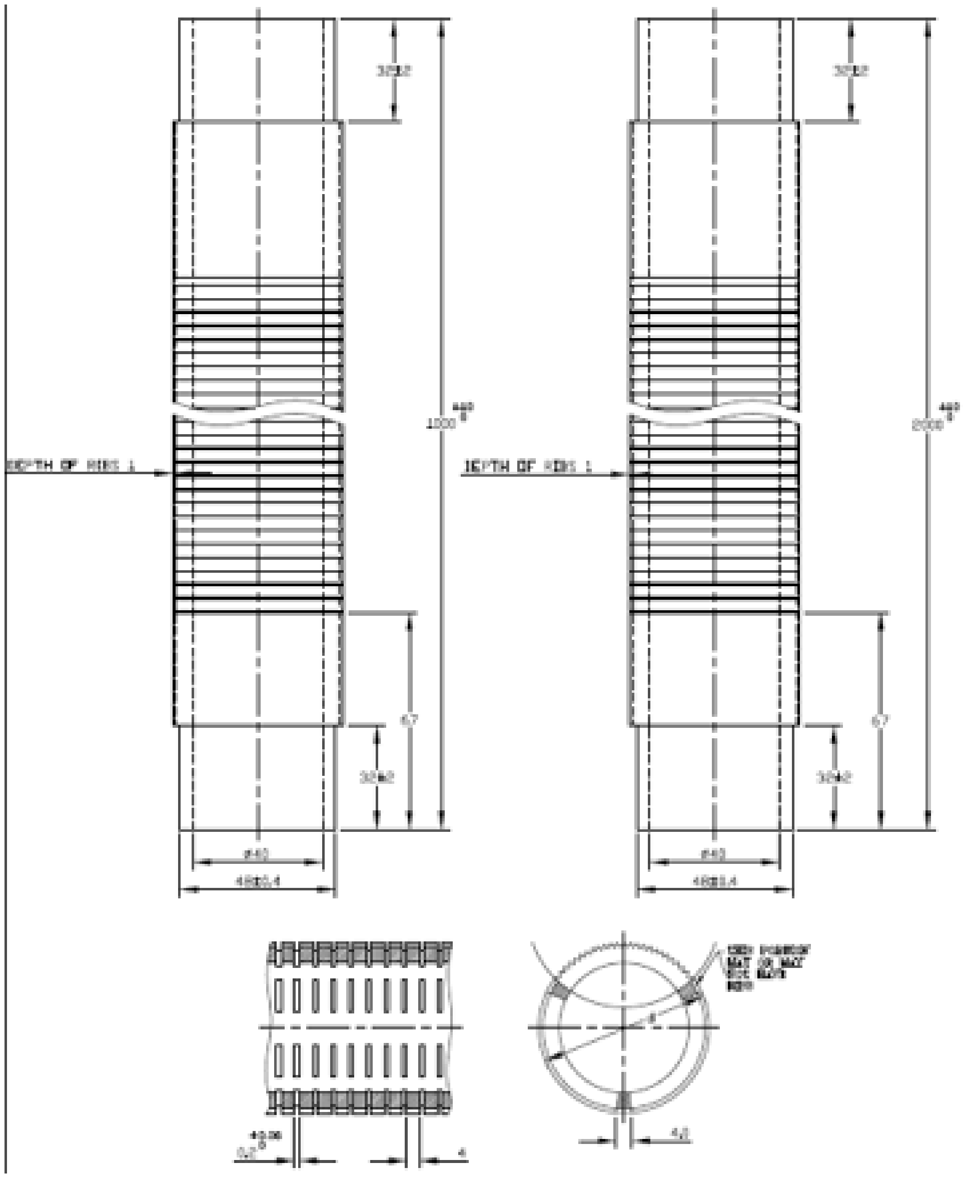
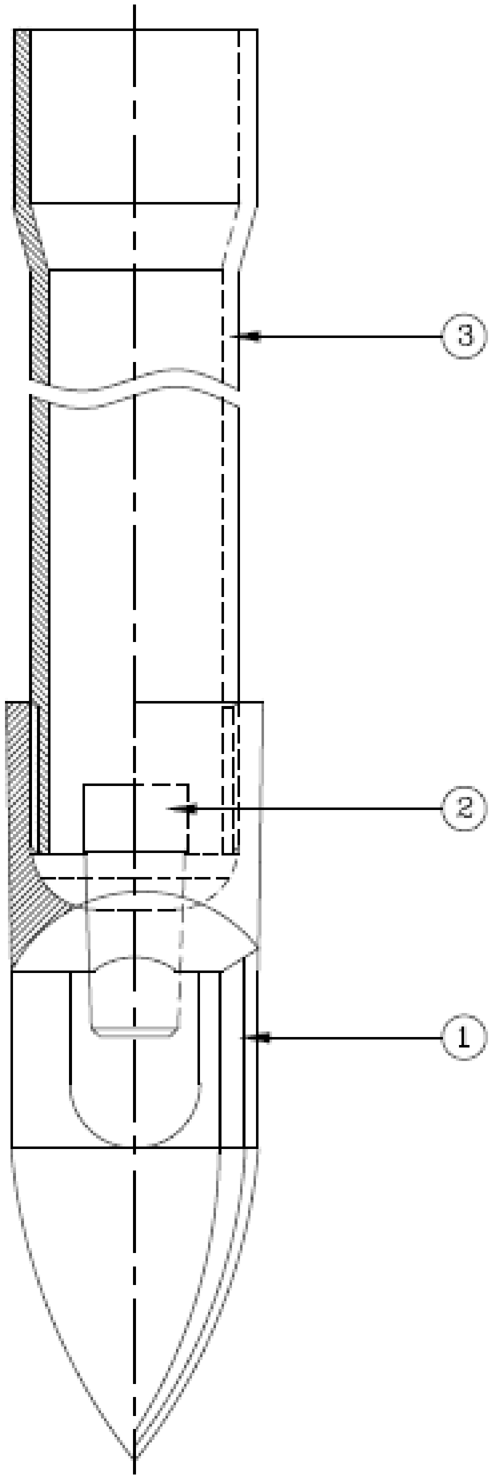
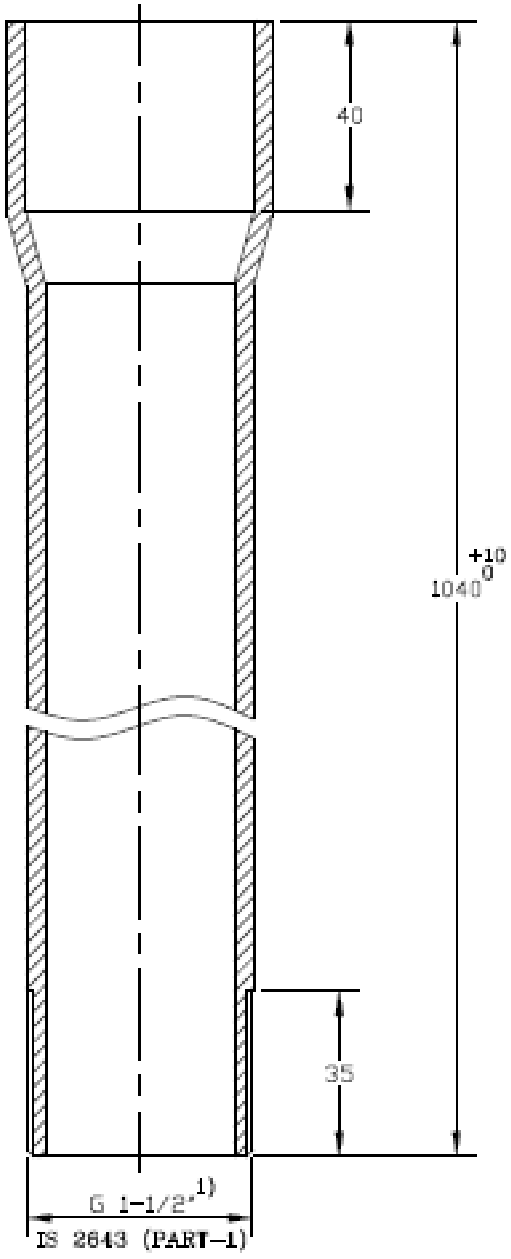


Fig 34C Ribbed Screen Pipe as Per IS 12818



3	1	Sand trap	uPVC
2	1	Plug	Grade FG 150 OF IS 210 : 2009
1	1	Cutter	Grade FG 150 OF IS 210 : 2009
Part No	No.Off	**Description**	**Material**

FIG. 35 SAND TRAP ASSEMBLY

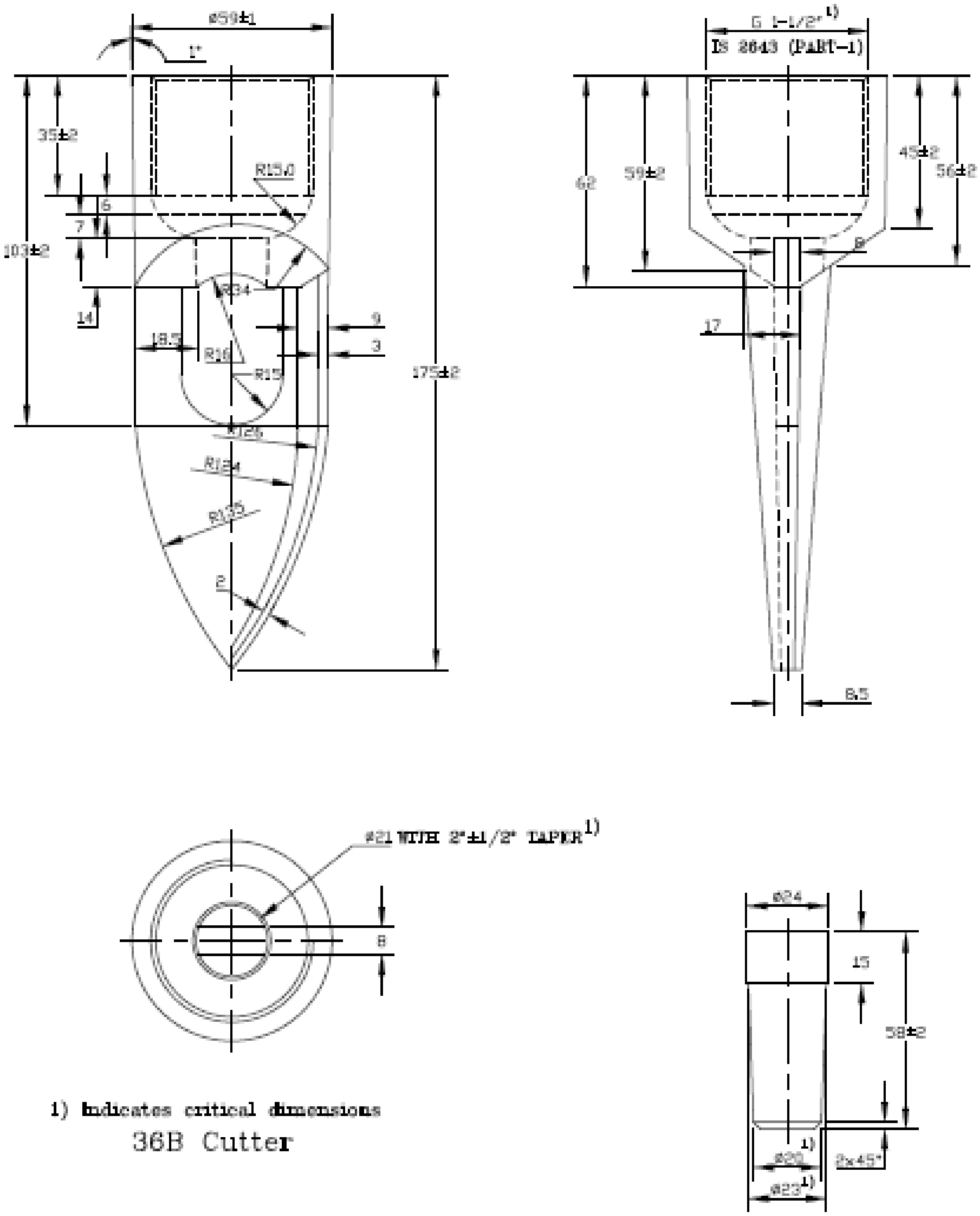


1) Indicates critical dimensions

36A Sand Trap

All dimensions in millimeters

FIG. 36 SAND TRAP ASSEMBLY PARTS (*Continued*)



1) Indicates critical dimensions

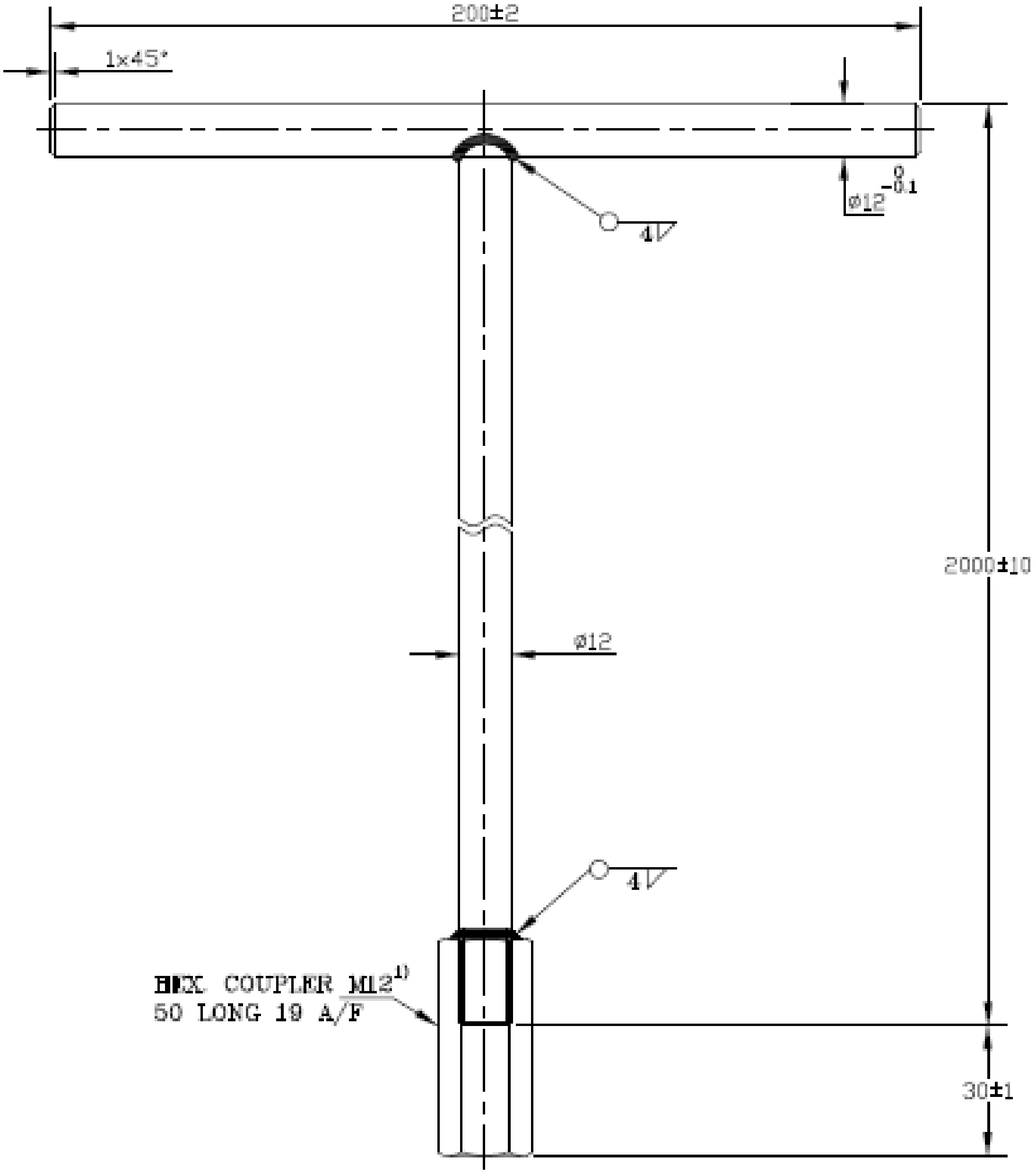
36B Cutter

1) Indicates critical dimensions

36C Plug

All dimensions in millimeters

FIG. 36 SAND TRAP ASSEMBLY PARTS

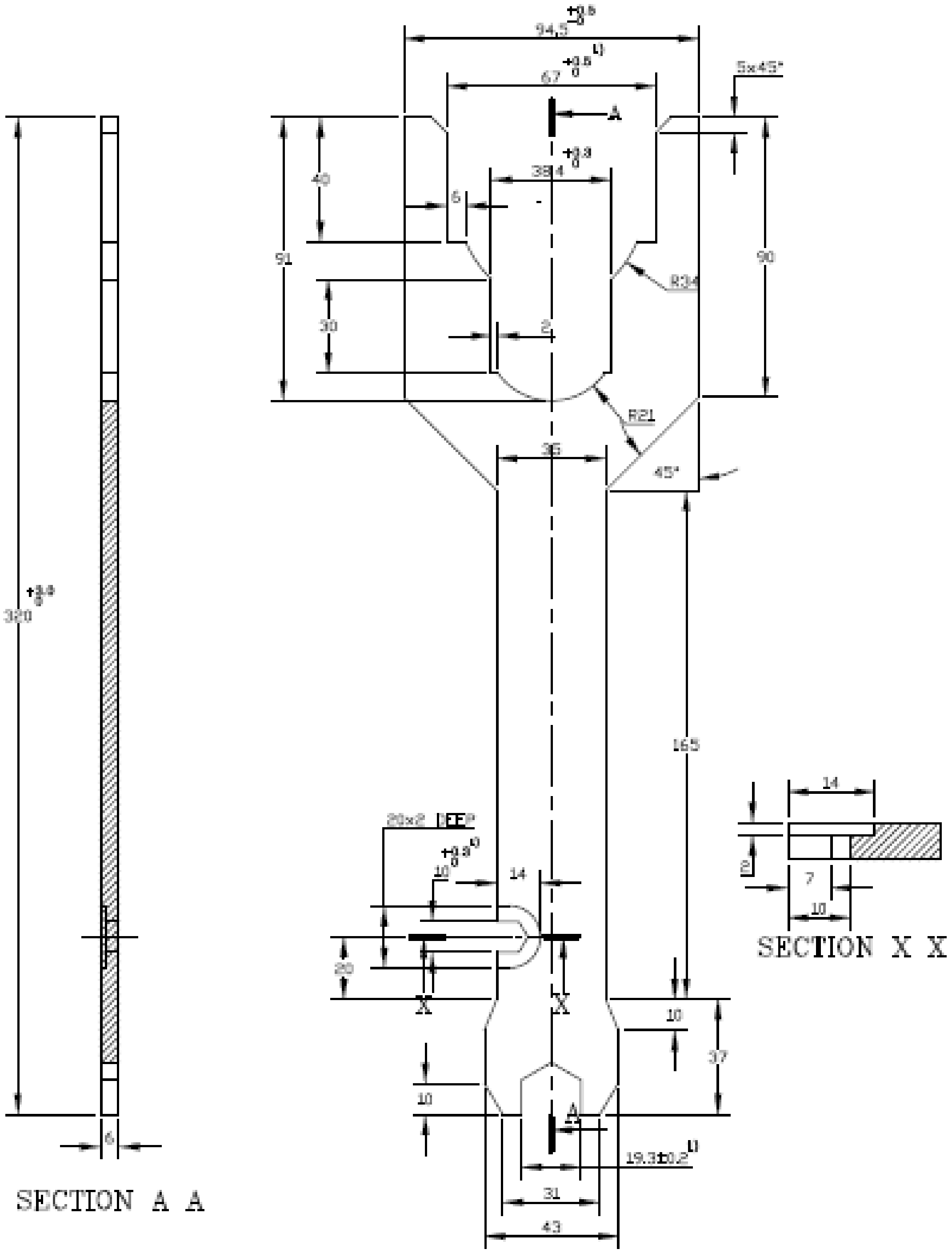


1) Indicates critical dimensions

Electrogalvanized to 30 micrometers (μm), Min.
Material for retriving rod shall be of grade A of IS 2062 : 2011

All dimensions in millimeters

FIG. 37 RETRIEVING ROD



1) Indicates critical dimensions
Material Grade A of IS 2062 : 2011
All dimensions in millimeters

FIG. 38 COMBINATION SPANNER

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDRADS

IS No.	*Title*
IS 210 : 2009	Grey iron casting (*fifth revision*)
IS 1239 (Part 1) : 2004	Steel tubes, tubulars and other wrought steel fittings: Part 1 Steel tubes (*sixth revision*)
IS 1363 (Part 2) : 2002	Hexagon head bolts, screws and nuts of product grade C: Part 2 Hexagon head screws (size range M5 to M64) (*fourth revision*)
IS 1363 (Part 3) : 2002	Hexagon head bolts, screws and nuts of product grade C: Part 3 Hexagon nuts (size range M5 to M64) (*fourth revision*)
IS 1367 (Part 2) : 2002	Technical supply conditions for threaded steel fasteners: Part 2 Tolerances for fasteners — Bolts, screws, studs and nuts — Product grades A, B and C (*third revision*)
IS 1367 (Part 14 Sec 1) : 2018	Technical supply conditions for threaded steel fasteners: Part 14 Mechanical properties of corrosion-resistant stainless-steel fasteners, Section 1 Bolts, screws and studs (*fourth revision*)
IS 1367 (Part 14 Sec 2) : 2018	Technical supply conditions for threaded steel fasteners: Part 14 Mechanical properties of corrosion-resistant stainless-steel fasteners, Section 2 Nuts (*fourth revision*)
IS 1367 (Part 14 Sec 3) : 2018	Technical supply conditions for threaded steel fasteners: Part 14 Mechanical properties of corrosion-resistant stainless-steel fasteners, Section 3 Set screws and similar fasteners not under tensile stress (*fourth revision*)
IS 1573 : 1986	Electroplated coatings of zinc on iron and steel (*second revision*)
IS 2016 : 1967	Specification for plain washers (*first revision*)
IS 2062 : 2011	Hot rolled medium and high tensile structural steel — Specification (*seventh revision*)
IS 2102 (Part 1) : 1993	General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications (*third revision*)
IS 2500 (Part 1) : 2000	Sampling inspection procedures: Part 1 Attributes sampling plains by acceptable quality level (AQL) for lot-by-lot inspection (*third revision*)
IS 2629 : 1985	Recommended practice for hot-dip galvanizing on iron and steel (*first revision*)
IS 2643 : 2005	Pipe threads where pressure — Tight joints are not made on the threads — Dimensions, tolerances and designation (*third revision*)
IS 2811 : 1987	Recommendations for manual tungsten inert-gas arc welding of austenitic stainless steel
IS 3428 : 2009	Dimensions for relief grooves (*second revision*)
IS 4454 (Part 1) : 2001	Steel wires for mechanical springs: Part 1 Patented and cold drawn steel wires — Unalloyed
IS 4759 : 1996	Hot-dip zinc coatings on structural steel and other allied products
IS 5206 : 1983	Covered electrodes for manual metal arc welding of stainless steel and other similar high alloy steels
IS 6481 : 1971	Guide for principal uses and styles of fibre board containers
IS 6603 : 2001	Stainless steel bars and flats
IS 7328 : 1992	High density polyethylene materials for moulding and extrusion
IS 7834 (Part 1) : 1987	Injection moulded PVC fittings with solvent cement joints for water supplies: Part 1 General requirements (*first revision*)
IS 9595 : 1996	Metal arc welding of carbon and carbon manganese steels — Recommendations
IS 12818 : 2010	Unplasticised polyvinyl chloride (uPVC) screen and casing pipes for bore/tubewell
IS 14182 : 1994	Solvent cement for use with unplasticised polyvinyl chloride (uPVC) plastic pipe and fittings

ANNEX B

(*Clause* 4.7)

SPECIFICATION FOR POLYACETAL

B-1 Properties of polyacetal are given below for guidance only:

Sl. No.	*Property*	*Unit*	*Value*
1	Density at 27°C	g/cm^3	1.42
2	Percentage water absorption (24 h immersions)		0.32
3	Vicat softening point	°C	174
4	Tensile strength	MPa	66
5	Percentage elongation at break		25
6	Izod impact strength	kg.cm/cm	5.98 to 7.62

ANNEX C

(*Clause* 4.9)

SPECIFICATION FOR NITRILE RUBBER COMPONENTS

Property	*Type 1*	*Type 2*
Shore hardness, Scale A	70 ± 5	80 ± 5
Tensile strength (MPa), Min	12.5	12.6
Ultimate percentage elongation, Min	250	150
Compression set after 24^{0}_{-2} h at 70 ± 1°C, max, percent	20	20

ANNEX D

(*Clause* 9)

RECOMMENDED PROCEDURE FOR PACKING

D-1 PROCEDURE

The following procedure for packing of direct action hand pumps is recommended:

Head, handle and stand, after being wrapped individually in polyethylene bags, shall be packed in a hessian bag with stuffing of straw around them.

PVC pipe set along with rubber and other loose components shall be packed in a 7 ply corrugated fiber board (CFB) box made of 120 GSM kraft paper having internal dimensions 3200 × 279 × 305 mm conforming to style 0302 of IS 6481 : 1971, with 'Lid' covering full height of the 'Tray'. All the creases are to be reinforced with calico-cloth of 75mm width to prevent tear. Two 280 x 305 mm pieces of 3 mm thick plywood shall be glued to the ends of the tray and two 15 mm holes drilled in plywood, tray and lid to facilitate placing of a cotton rope as sling handling the packed box. The total weight of the box shall not exceed 500 N (50 kg).

The pipes, starting with the larger diameter first, shall be filled in the tray and items like sand trap, screen, piston rod assembly and retrieving rod be kept at the top after being covered with a 2 ply corrugated liner with proper blocking to arrest their movement. Rubber and other loose components, duly packed in polyethylene pouches, shall be placed in the box. A suitable material like rubberized coir or paper shredding's shall be placed on the top for providing cushion for pipe movement inside.

The box will be strapped at least at 5 places at regular interval with 12 mm polypropylene strap.

All the threaded portions having male threads shall be fitted with plastic thread protectors before packing.

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